

**DOCUMENTS**

**RELATIVE**

**TO A COMMUNICATION**

**BETWEEN**

**PITTSBURGH AND THE OHIO CANAL.**

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**PITTSBURGH:**

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# DECLARATION

of the

STATE OF NEW YORK

IN SENATE

## INTRODUCTION.

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To those who have watched the progress of the Ohio Canal, and reflected on its inevitable control over the trade of the West, it has always been apparent, that so long as this great work presents an unbroken communication to the Lake—without opportunity of turning aside, at any point, to Pennsylvania—its effects must be disastrous not merely upon Pittsburgh, but upon the whole line of our vast and expensive public works, as well as upon the commerce of Philadelphia. Nor has it been less apparent, that the direction thus given towards the New-York Canal was a forced and unnatural one; and that a slight effort would be sufficient to counteract the evil, and to render what is now so mischievous tributary to our interests.

Yet nothing has been done. Increasing complaints are daily heard from our merchants and manufacturers of the fulfilment of predictions, made long ago as to the result; but we seem, at this moment, to be not one step nearer to a vigorous effort of self-defence. Undeniably, the time has arrived when, if ever, a final resolution, must be taken, either to claim, speedily and energetically, the advantages of our position, or to abandon many of them which are most obvious and valuable. Hereafter, when new ties, sympathies and entanglements shall be connected with the course which Western trade is now rapidly taking, it may be impossible to remedy the consequences of supineness at the present moment.

To promote, if possible, a spirit of hearty and zealous co-operation in reference to this important undertaking, is the object, though in a manner very humble and inadequate, of the following pages. Desultory efforts have been made, and occasional sallies of enthusiasm witnessed, in favor of this or the other route; but there has been no attempt to submit to the good sense of the community a candid and comprehensive view of the several projects which have thus, at different periods, been urged with equal vehemence. The consequence is, that each has taken its turn of favor and denunciation; and public opinion, distracted and irresolute, is deprived of all its force. How can it be expected that we can successfully invoke the aid of others until we exhibit amongst ourselves something like concert and steadiness of purpose?

It is far from being pretended that the Documents here submitted are sufficient to warrant a final decision. They aspire only to furnish a safe *starting point* for reflection and inquiry; and so to present the subject as to enable the reader to comprehend, and to test, the arguments and assertions which may be employed on either side. He will thus be not left altogether at the mercy of bold asseverations, often recklessly hazarded under the impulse of sectional feeling or individual interest.

The frank and candid spirit which has been aimed at seems due not less to good policy than to good faith. It is better that reasonable doubts, and a fair comparison of advantages and facilities, should precede the formation of an opinion than that hasty confidence should be excited, as has sometimes been the case, by sanguine partisan statements, only to be dis-



turbed (perhaps with a feeling of alienation and disgust in reference to the whole subject) when there unexpectedly starts up to view a rival project, presenting plausible claims, which had either been altogether kept out of view, or unjustly disparaged.

With these preliminary remarks it is proposed to exhibit in the first place the information extant, in an authentic form, as to the general advantages of the proposed communication, and *then* the various projects for its accomplishment.

### *General advantages of the proposed Communication.*

The Report, dated 23d January, 1832, of a committee appointed at a Town-meeting of the citizens of Pittsburgh, on the subject of a Rail Road to Massillon, exhibits the earliest effort to digest the copious materials in reference to this point. Though looking to a particular place, and mode, of contact, much of it is of general application; and the high character of the gentlemen composing the committee, furnishes sufficient assurance of the care and accuracy with which their inquiries were conducted, and of the fidelity with which the result has been reported.

It is necessary, however, to bear in mind with what astonishing rapidity the vast resources of the region west of us are daily unfolding themselves, and that the committee refer to the state of things *two years ago*. The following are extracts:

"Of the necessity of some mode of communication with the interior of the State of Ohio, perhaps all are equally convinced. The inexhaustible fertility of her soil, and salubrious character of her climate, have pointed her out as the chosen residence of the enterprising and industrious from all parts of our extended country. 'This giant,' says a valuable writer, \* 'yet in its cradle, first sprang to life in 1788.' And now her offspring number ONE MILLION of souls. The progressive population of this State gives some indication, and speaks with prophetic promise of her future greatness and importance.

In 1790— 3,000.  
1800—45,365.

In 1810—230,760.  
1820—581,434.

1830—937,679.

Of the character of her soil the same writer remarks, 'Taken as a whole, this truly productive tract has no equal on earth.' Already has she become the granary of the Union; whilst the variety of her agricultural products is only surpassed by the industry which yearly augments their quantity to an amount that sets all comparison at defiance. The best evidence of the extent of her resources is to be found in the fact, that on the line of her State Canal, of which but 344 miles are completed, and its communication with the Ohio River not yet opened, the receipts for tolls during the year, ending the 15th Nov. 1831, were \$100,112,05; being derived altogether from the transportation of her own products to market, and from the foreign merchandise and manufactured articles from other sections of our country, imported for her own consumption.

Is it necessary to remind Pennsylvanians that the produce on which a part of these tolls were collected has principally found its way to the New York market; and that the merchandise on which the remainder were levied was chiefly purchased in the same market, with the proceeds of the sales of that produce?

But a still more accurate idea of the surprising and rapidly developing resources of this wonderful tract of land may be found in the following statistical returns of the collector of tolls at the port of Cleveland.

\* Mr. Darby, in his "Historical, Geographical, and Statistical View of the United States."



There were received at that port during the month of September last, by the way of the canal, 2,161,925 lbs. of property, consisting, in part, of

|                |          |
|----------------|----------|
| 18,149 bushels | wheat.   |
| 2,260 bbls.    | flour.   |
| 44,166 lbs.    | potash.  |
| 56,838 "       | butter.  |
| 24,561 "       | cheese.  |
| 127 hhds.      | tobacco. |
| 40,203 feet.   | lumber.  |

And during the same month there were cleared for ports on the canal, and the country adjacent, 2,461,670 lbs. of (in part) the following articles of merchandise:—

|              |                                      |
|--------------|--------------------------------------|
| 4,353 bbls.  | of SALT.                             |
| 103 "        | fish.                                |
| 131,920 lbs. | gypsum.                              |
| 54 m.        | shingles.                            |
| 800,365 lbs. | foreign merchandise and manufactured |

goods, of various descriptions.

This, however, is the business but of one month. The following returns will place the necessity and advantages of an improved mode of communication with that State in a still stronger light.

Of the different articles received at Cleveland, by the way of the canal, since the opening of navigation last Spring up to the 1st of October\* last, there were

|                 |           |
|-----------------|-----------|
| 245,471 bushels | of wheat. |
| 53,925 bbls.    | flour.    |
| 394 hhds.       | tobacco.  |

And there were cleared for ports south of Cleveland during the same time,

|              |              |
|--------------|--------------|
| 53,165 bbls. | of SALT.     |
| 6,762 "      | fish.        |
| 1,519 tons   | merchandise. |
| 848 m.       | shingles.    |

That a very large proportion of this valuable and growing trade may be diverted to our own markets by the proposed Rail Road, when the line of our State Canal and Rail Road to Philadelphia shall have been completed, the committee are fully persuaded, from a careful examination of the various causes that influence merchants in their selection of a route for the conveyance of merchandise. These are,

The advantages of the market with which it communicates;

The cost and time of transportation;

And the safety of the mode of conveyance.

In regard to the first of these considerations, as applied to this question, it is but necessary to remark, that until the completion of the New York and Ohio Canals, Philadelphia was always the chosen and favorite market of the merchants of Ohio. That confidence, the committee unhesitatingly declare, still exists. After very extended and careful inquiry, they have found the general expression to be that of undiminished confidence in the merchants of Philadelphia, and in the advantages of its market. So great indeed is, even at the present time, that confidence, that, with the proceeds of their produce sold in New York, many procure their supplies of foreign merchandise in Philadelphia, which is thence shipped to New York, to be forwarded by the Erie Canal. But however partial may be their preference to the Philadelphia market, it will never be carried so far as to come in competition with their *interest*. This, after all, is the touchstone of a merchant's operations.

But another important consideration remains to be noticed; and that is, the com-

\* This, it will be observed, does not embrace the business of the important months of October and November. The committee regret that they have not at hand the returns of the entire season.



parative *safety* of the modes of conveyance on the two routes. In this respect the most decided advantage would be with ourselves. With a route, 502 miles in length, there will be but 274 miles of Canal navigation (adopting the Rail Road from Philadelphia to Columbia, as part of the route;) whilst that by the Ohio Canal, Lake Erie, the New York Canal, and the Hudson River is 773 miles, embracing 190 miles of proverbially dangerous Lake navigation, 150 miles of River, and 433 miles of canal navigation.

The urgent necessity for the proposed communication will still further appear from the fact that large quantities of English IRON are now brought from New York, by the way of the Erie and Ohio Canals, and sold in the towns bordering on, and lying westward of the latter work, at a price as low as Pennsylvania iron is now sold in this city; thus entirely excluding an important domestic interest from competition in a market it has heretofore exclusively enjoyed.

TIN PLATE, too, which is another heavy article, is brought from the city of New York and carried as far south of Cleveland as Zanesville, and there sold, yielding a fair profit to the merchant, at the same price for which it can be afforded in Pittsburgh, when brought hither by the most economical route from New York, namely, by the way of New Orleans.

It will have been perceived that of the articles cleared for ports south of Cleveland, from the commencement of Canal navigation in the Spring, up to the first of October last, there were 53,165 bbls. SALT. The amount received at, and forwarded from, that place, during the entire season, could not probably have fallen much, if any, short of 70,000 bbls. This must have been the almost exclusive manufacture of the works in the state of New York. Equal facilities exist for its manufacture in the vicinity of this city, and for the production of an article of as good quality, as are to be found in that state. With no excise duty upon it, with a more certain, more speedy, shorter and less expensive route for its transportation, it would, by the contemplated Rail Road, reach the state of Ohio under circumstances enabling it to sustain a full competition with that manufactured and brought from New York.

Of the article of GYPSUM it may be remarked that inexhaustible beds are found in the vicinity of Sandusky. By the Ohio Canal and the proposed Rail Road, it could be brought to this city, and sold, yielding a profit, at \$10 per ton. The price in this city, at the present time is nominal, say \$30 per ton. Of this most invaluable article, our farmers now cannot avail themselves. Could it be readily obtained, and at a moderate price, it would, without doubt, soon become an important item of transportation; whilst our agricultural interest would be most sensibly benefited.

The article of WHITE FISH could also be brought to this city, and sold at a price considerably below that of any other description of fish usually sold in this market.

LUMBER, particularly pine planks, boards and shingles, is now brought in large quantities from Canada to Cleveland, and shipped thence to almost every point on the Canal. This article it is confidently believed could be supplied from this city, of as good quality, and at as low a price as that from Canada.

To the manufacturing interests of this city, this project is of the last importance. Dependent, as all manufacturing towns necessarily are, for its success on its proximity to a market, and its facilities for the distribution of its wares, it presents a claim to legislative patronage which may well command the most serious attention. Whilst our manufacturers look with confidence to the acts of our national councils for protection against foreign rivalry, with equal confidence do they rely on our state legislature for the requisite security against domestic competition. With advantages for manufacturing, fully equal to those of the most favored section of our country the only boon they ask from our public authorities, is patronage to those projects which have in view to open communications to new markets, or to improve those which have been rendered unavailable by the cheaper and more expeditious modes of transportation now adopted by their neighbors. It may here be remarked that that section of the state of Ohio, with which the proposed Rail Road will communicate, has, heretofore, been one of the favorite markets for the disposition of Pittsburgh manufactured iron, nails, shovels, spades, door locks and hinges, and other articles of iron, window and flint glass, cotton yarn and cloths, and various other productions of minor, though in the aggregate of great, importance. And the consideration is also of much weight, that it is a market of *consumption*, not simply of *sale*, whereby an intermediate profit is saved, both to the producer and consumer."



*Extract of a Letter from James Duncan, Esq. dated Massillon, 2 September, 1833.*

"You ask whether any circumstances have occurred to strengthen or weaken the views taken in 1831. I am not aware that any material change has taken place in the public mind in this section of country as to the feasibility and importance of the connection. The increased business and wealth of the country make the long winter interruption to Lake Erie and the New York Canal navigation to be more sensibly felt than it was two years ago, and would stimulate more powerful exertions, to open a communication to the Eastern cities by some other route less liable to that objection."

*Extract of a Letter from the Hon. E. Whittlesey, dated Canfield, (Ohio) 27 August, 1833.*

"By co-operating with Pittsburgh, Philadelphia has it in her power to compete with New York for the Western and North Western trade, which is increasing far beyond human foresight.

"The distance from Cleaveland to Philadelphia has been computed to be less by 300 miles than from Cleaveland to New-York. But distance is not the only advantage in favor of the route through Pennsylvania. It may be used weeks earlier in the Spring and later in the Fall, than the route through New-York. If the Philadelphians have any doubt about the extent, magnitude or value of this trade, let them institute a commission from the most intelligent of their merchants to obtain information. The merchants in New-York would pursue this course under like circumstances; but their intercourse with the whole of the vast Western region is so constant that there is not a settlement commenced without their knowledge, nor does an article in which a profitable trade can be carried on, escape their notice."

"Communications will be opened with the Northern parts of Indiana and Illinois by canals or rail-roads which will increase the importance of the improvements spoken of, to Pittsburgh, and to Pennsylvania.

"The convention of those interested in the Chesapeake and Ohio Canal, which sat at Washington in December, 1824, passed a resolution that it was contemplated to terminate the Chesapeake and Ohio Canal at Lake Erie, or at some suitable point on the Ohio Canal. It was then believed that the General Government would bear the expense of constructing a Canal to unite the Western and the Eastern waters. I think aid may yet be obtained from the General Government. If the State of Ohio had funds at its disposal I have no doubt a due share of them would be appropriated towards the construction of this connecting link."

New York is fully aware of all this. The Buffalo Journal of 21 Aug. 1833, has a long article pointing very clearly to the effects which will result from "the completion of the Canals of Pennsylvania, *with the additional works* that they will bring into existence *in order to make her system available.*" One of the projects which the restless enterprise of our great rival has suggested, and is about to act on, in order to render the Lake attractive to the commerce of the West, is a rail-road (for which subscription books have been opened with the most flattering prospects of success) from Sandusky, on Lake Erie, to Mad River, so as to communicate with the Dayton Canal. By this route the entire distance from the Lake to Cincinnati is only 218 miles, promising, as our neighbors hope, an irresistible allurements to "the grand total of travel and transportation that is destined hereafter, and that now seeks, our roads and canals, from the regions of the Southwest, on their way to market."

The Buffalo Journal says:

"Several of our citizens were gratified last week by an examination of the Maps and Projection of the route of this road by Mr. Stansbury, the U. S. Civil Engineer,



under whose direction the survey was made. The information imparted by Mr. S. derived from an intimate knowledge of the whole country through which the road passes, gave additional confidence in the entire practicability and importance of this road. General Vance of Ohio, and Judge Mills of Connecticut, two of the Commissioners for opening the subscription books for the capital stock of this rail-road have arrived in town. In New York they were joined by the other Commissioner, H. G. Phillips, Esq. of Dayton, the President of the Company."

An inspection of the Map will shew that a cross line of communication between this work and the Ohio Canal is inevitable, and that all the accumulated treasures of both may be made to pour into Pennsylvania: The reasons which dissuade from a Lake navigation from Cleaveland apply with yet greater force to that from Sandusky.

The disadvantages under which the western merchant now labors, in deriving his supplies through Buffalo, whose harbor is choked with ice to the middle of May, is set forth in the representations of a great meeting in Portage county, Ohio, responsive to an inquiry from New-York, relative to the projected rail-road from that city to Akron on the Ohio Canal:

"We are now shut out from all communication with the seaboard by water, for six months in the year. The merchant and manufacturer make their calculations for this, and pay themselves, in the price of articles purchased of the grower, for insurance against a change of market price before the article can be taken to market, as well as the interest on the capital invested."

It must be obvious; indeed, that in order to insure the universal resort to the Pennsylvania route, it is only necessary for any *one* storekeeper in the West, to get his spring goods and spring fashions by it six weeks earlier than his neighbor who relies on the opening of the harbor of Buffalo.

*The following Letter from Mr. John Everhard, dated Massillon, 10 September, 1833, may serve to shew the rapid march of improvement in this region:*

"In compliance with your Note requesting a statement of the amount of produce cleared at the port of Massillon, as well as the amount of Tolls received during the two years last past, I can only add, that as the books and papers are annually forwarded to the Auditor's Office, I have not the means in my power of ascertaining the amount of shipments and exports, except several of the leading articles belonging to our staple commodities, of which I had kept a statement for my own satisfaction—such as Wheat and Flour.

|   |                 |
|---|-----------------|
|   | Bbls.           |
| The amount of Flour cleared at this Office during 1831, was about   | 15,000          |
| The amount of Flour cleared in 1832, was about                      | 16,000          |
| And the amount from 1st April, to 1st Sept. in the present year, is | 19,260!         |
| The amount of Wheat cleared at this office during 1831, was         | 98,000 bushels. |
| The amount cleared during 1832, was                                 | 148,200         |
| And the amount the present year, from 1st April to 1st Sept. is     | 135,000!        |

And the amount shipped in September, with the amount now in the warehouses, is about 20,000 bushels, which leaves no doubt in my mind but that there will be shipped the present month 25,000 bushels—but as we have not the books to ascertain the shipments during the same months, in former years, we cannot compare the business with any degree of accuracy. In my opinion the amount of Tolls collected is the best criterion of the amount of business done, and the comparative increase—as the principal amount of our Tolls is collected on exports. There is not so much received on passengers here, as at the Offices at the southern part of the Canal and at Cleaveland—as the tolls on passengers is only collected where the clearance



is deposited, so that all passengers arriving at this port from the South, are generally conveyed on boats bound for Cleveland, consequently the toll is collected at Cleveland.—On the other hand, owing to the scarcity of good line boats, the proprietors of the several lines have selected their best boats for what they term long line boats, which are all destined for longer voyages than merely to this port, and as freight is the principal object of the short line boats, very few of them are fitted out for the accommodation of passengers—it therefore follows that the passengers, though they be bound for Massillon, will, notwithstanding, take passage on a boat bound for the extreme South, and therefore the toll is not received at this office. I mention this circumstance merely to shew, that although our traveling has probably increased 300 per cent. within the two years, yet we realize less tolls at this, on passengers, than formerly—and moreover that the increase in the amount of tolls received, is not in consequence of the additional travel, but goes strongly to prove the comparative increase of our surplus commodities.

|  |           |
|--|-----------|
| The amount of tolls received during the year 1831, at this office, was | \$5884 27 |
| The amount received during 1832, was                                   | 9106 18   |
| Making an increase of more than 50 per cent. in one year.              |           |
| The amount received from 1st April to 1st September, 1831, was         | \$4242 80 |
| The amount received in the same months in 1832, was                    | 6251 91   |
| The amount received the present year during the same months, is        | 8524 19   |

which shews an increase of about 35 per cent. over the same space of time in 1832, and about 100 per cent. over 1831—and it is acknowledged by our business men generally, that the prospects bid fairer for the coming fall's business, than they did, the last year. As this information is evidently intended to shew the importance of this point of intersection, in a commercial point of view, I would further remark that the three flouring mills in this vicinity, immediately north of this town, are not included in the range of this office, and, although one is within a mile, and the others three miles, yet the product of them, bound for the lakes, is cleared at the office at Akron, and is not included here. I hope to be able to give you a minute detail of the present year's business at the close of navigation.

In the Philadelphia National Gazette, of 17th September, a correspondent who had just returned from the west, says,

“I was so convinced of the strong probability of my native city losing a greater part of that trade she now enjoys, that I cannot abstain from laying before my fellow citizens, the result of my observations, in the hope that it will arouse them from the lethargy that now exists in regard to this matter.

Already New York has taken many valuable customers from us, owing to the decided saving made by them in forwarding their goods by the New York and Ohio Canals, at the reduced tolls. Goods are now carried by the different day and night canal boat lines, with great care and despatch, and delivered on the Ohio river, at Portsmouth, the debouche of that canal, with great precision and regularity, as well as at the intervening points.

The want of enterprise in our community is already severely felt, and will be more so, and perhaps some of our fellow citizens deeply interested in the prosperity of this city, (I allude more particularly to the real estate holders,) have overlooked, or not duly appreciated the value of our being at least on an equality with those cities, in point of cost of transport hence to the Western waters. Believing that many are not aware of the great reductions that have taken place elsewhere, and of the probabilities of the cost of transport being still more curtailed, I now invite them to investigate this matter thoroughly, and if they do not become convinced of the propriety of our being constantly on the alert as to the exertion of our sister cities to concentrate the trade in themselves, I am much deceived as to their sagacity and foresight.”

The Cleveland Herald of 12th September, 1833, supplies the following interesting facts:



"In the year 1825, the number of vessels which arrived at this port, was 75. Of these, 21 were steam boats. The value of the articles exported that year, amounted to only 50,166 dollars—imports, 132,645. Business continued gradually but slowly to increase until the year 1829, when the produce of the Ohio Canal gave it a fresh stimulus. The result of that year exhibits an increase over the preceding of more than one hundred per cent. The number of vessels which arrived that season was 314. Of these, 90 were steam boats, and the residue sloops and schooners. The amount of property exported, was \$222,000; that imported, \$568,00. The subsequent year, 1830, exhibits a corresponding increase. The number of arrivals was 775; and the business in proportion. Last year, the value of commodities exported, may be at a million and a half; and that imported, at two. The number of arrivals, at 1,070, of these, 470 were steam-boats. From the transactions of the present year, up to the middle of last month, the value of exportations, the present season, may be estimated at about *two millions*; and importations at *four millions seven hundred thousand dollars*. Thus, it will be seen, that the value of our exportations has increased, in the short space of eight years, from *fifty thousand* to *two millions*; and the importations from *one hundred and thirty-two thousand six hundred and forty-five dollars*, to *four millions seven hundred thousand dollars*! What a commentary is this upon the value of internal improvements and the resources of this young but flourishing country! It speaks volumes in favor of the growing importance and value of this trade. *It forms, however, when compared with the aggregate business of the lake, and the upper lakes, which are constantly pouring in their rich treasures upon her bosom, but an item of the vast amount.* This trade, which has been so rapidly augmenting, has, as yet, no settled route, or established market. Hence arises the anxiety of the different states, to secure, while practicable, the 'golden harvest.'"

The same paper had previously remarked:

New-York and Montreal, owing to the improvements which have been made, and the facility of access to them, have heretofore been the great marts for the sale of western produce. Both these channels are closed a great portion of the year by the climate, while the navigation of the Ohio canal, and the ports on the lake from Cleveland westward, are perfectly unobstructed. A more southern route, therefore, to the seaboard, is an important desideratum to the western states. The opening of the Wabash and Erie canal, running through a rich and rapidly improving country, and penetrating into the heart of Indiana, will lay open the whole valley of the Wabash, and will add an important item to western commerce: This trade must, of course, come through Lake Erie, and seek some outlet from thence to the eastern or northern markets.

The state of Pennsylvania, is seriously agitating the subject of a cross-cut through a portion of this state, to communicate with the Ohio canal at the Portage summit. Should this be effected, a communication to the sea-board would be open about two months longer in the year than it now is, and would enable dealers in produce, who might wish to do so, to get their articles to the eastern markets a month earlier than they are now enabled to do, through the New-York canal; and what is frequently of no small importance to western merchants, it would enable them to procure their supplies of merchandise much earlier in the season than they now do. The late season at which the New-York canal is open in the spring, is an inconvenience which is seriously felt by western merchants, and from the multiplicity of business which is accumulating upon it, the evil is constantly increasing. Indeed, the time is not far distant, when it will be impossible for the amount of business which would naturally flow through it to be transacted upon it. Those who have witnessed the rush of business on its opening in the spring, the crowd of boats, and contention for precedence at the locks, and contemplate the *new world* which is opening in the west, the natural channel for the trade of which is through this canal, will readily be convinced of this fact. The *necessity*, therefore, as well as the convenience, of other channels of communication, will soon be apparent.



Assuming, then, as indisputable, the great importance of a communication, let us consider the various

#### METHODS PROPOSED FOR REACHING THE OHIO CANAL.

It may form a preliminary consideration of some moment, that a communication by canal and slack-water is now nearly completed, from the town of Beaver, at the mouth of the Big Beaver, to New Castle on Shenango creek. The whole expense of this work is estimated, in the report of the Pennsylvania Canal Commissioners of 29th November, 1832, (p. 22,) at \$419,581 18. The amount stated in that report as required to complete it, was appropriated by the act of 16th February, 1833, (Pamphlet Laws, p. 45.) By a subsequent act of 27th March, 1833, (Pamphlet Laws, p. 100,) the Commissioners were directed to “cause to be constructed a *towing path* to the *head* of the slack water on the feeder dam at New Castle.” This will add to the foregoing estimate. The state of the work is thus described in a letter from a highly respectable and intelligent gentleman of Beaver, dated 30th of August, 1833:

“I am assured by the principal Engineer, that the Beaver Canal will be completed this fall; and from what I have seen of the line, I am led to believe it will be, if the waters continue low through the month of September. The river, or out-let lock into the Ohio river, is the most backward, and that may be completed in a month or six weeks, by proper exertions. The rest of the line is in great forwardness, and when completed, should the out-let lock and debouchement into the Ohio not be finished, the navigation into the river will be open, as the water in that river when high enough for good steamboat navigation, will flow into the second lock on the Beaver. So that I think you may calculate with sufficient certainty, that we shall have, next spring, a canal and slack-water navigation, of the Beaver and Shenango, of 27½ miles, for by the act of the last session, the Canal Commissioners were authorized, and they have put under contract, five or six miles of towing path, on the pool of the Shenango dam above New-Castle. This towing path was not included in the last year’s estimate, which, with the expense of opening a channel into the Ohio river from the out-let lock at the mouth of Beaver, will have to be provided for by a new appropriation of say \$30,000. It is said that about \$80,000 of the Girard legacy was applied to this canal. This, with the specific appropriations already made, and the additional sum of \$30,000, supposed necessary to complete the line, will swell the amount of the work when completed, to a little more than HALF A MILLION OF DOLLARS on 27½, or, as it is said, 28 miles.”

The mechanical work on this route, is described by the Canal Commissioners in their last report, as “equal to any of the kind in the commonwealth.” The letter just quoted, says,

“I should have mentioned, when on the subject of the Beaver Canal, that the stone work has been executed in the most permanent and substantial manner; and the dams are, with few exceptions, founded upon the rock, and are well constructed, and the whole work promises great durability.”

Another consideration which may enter materially into the inquiry—and connected in some degree with the preceding—is as to the portion of the route between Pittsburgh and Beaver. The navigation between these two points, is subject to annual interruptions during the low stage of water. Although, therefore, a satisfactory medium of communication may be assumed as now existing between Pittsburgh and New-Castle during the season of most active business operations, yet artificial means of rendering it availa-



ble, at all times, ought to be taken into view. The following is from a letter of General Lacock, of Beaver, on the subject, dated 12th of September, 1833.

"I have thought much in regard to the mode of improvement that should be adopted between Pittsburgh and Beaver, and have brought my mind to the result that a *Rail Road* is the most eligible. The plan of damming the Ohio must be rejected as totally inadmissible. It is the wildest and most visionary scheme ever thought of. The difficulty of sustaining dams over such a stream upon a sand or gravel bottom; the size of the locks necessary to pass steamboats; piers, &c. of stonework above the flood, to secure the locks from ice freshets, would swell the expense enormously, and to an amount that cannot be well estimated. And after all, were the navigation completed as proposed, it would, at certain stages of the water, be vexatiously impeded, especially as it respects the lumber trade. To pass the locks, the rafts must be divided; and I have seen lumber in a single day pass down the Ohio that could not, in separate parcels, be taken through the locks in six weeks. Enough of this. The expenditure of from twenty to twenty-two thousand dollars per mile, will make a lock and canal navigation between the points in question. But how will the canal be supplied with water? The supply from the Kiskeminetas will be insufficient for that purpose. With a brisk navigation at a low stage of water, the Kiskeminetas will be a scanty supply to Pittsburgh. Hence there is but one resource left—to feed the Pittsburgh and Beaver canal from the Allegheny river by steam power and force pumps.\* What will be the original and current expenses of such an establishment, I know not. You have the means of ascertaining the fact by the Pittsburgh water works. A *rail-road* from Pittsburgh to Beaver, with double tracks, will cost not more than the sum I have stated as necessary to complete a canal. The fall is about thirty feet; of course, a level line may be adopted the whole way to the mouth of Beaver, or such trifling variations from it as to best suit the ground. In short, there cannot be found in the union a more convenient and beautiful route for a rail-road, and few that will be more useful. It is nevertheless true, that as to ponderous articles, the inconvenience of breaking bulk and reloading, must be submitted to, so that a choice of difficulties presenting themselves, I have been led to consider, upon a view of the whole subject, a rail-road the most eligible improvement that can be adopted."

Let us now turn to the several projects. The first which, in order of time, engaged public attention was

## I.

A Canal from Pittsburgh to the town of Beaver; thence up the Big Beaver to the Mahoning; and thence along the valley of the latter stream, &c., to Akron on the Ohio Canal.

By an act of the legislature of Ohio, dated 10th of January, 1827, [recited at large in the acts of Assembly of Pennsylvania, for that year—Pamphlet Laws, pages 371, &c.,] a company was incorporated under the title of "The Pennsylvania and Ohio Canal Company," with authority, so soon as the legislature of Pennsylvania shall assent, to construct a canal from such point on the Portage summit of the Ohio Canal as the Ohio Canal Commissioners shall direct, to the waters of Mahoning river, and thence to meet or intersect the Pennsylvania Canal, or the Chesapeake

\* The reliance of Mr. Whippo, engineer, was on a supply by the way of Beaver. Speaking of the projected route up the Shenango, he says: "The three last sections of this Canal have no feeders of importance, and must, therefore, depend principally upon French creek. Below these, the two Shenangos and the Beaver can be taken in, and will furnish an abundant supply from the mouth of Crooked creek to Pittsburgh." (Journal House of Rep., 1827-28, vol. 2, p. 312.)



and Ohio Canal, at or near the city of Pittsburgh; and in case either of said canals shall be continued from Pittsburgh down the Ohio river, and up the valley of the Big Beaver towards Lake Erie, *then* with liberty to intersect either of said canals at the most suitable point.

On the 14th April, 1827, (Pamphlet Laws, page 369,) the legislature of Pennsylvania expressed its full and entire assent to all the provisions of this charter.

It appears by the official report of the Board of Ohio Canal Commissioners, dated Columbus, 17th January, 1828,\* that the survey and location of so much of the contemplated route as is within the limits of the State of Ohio, were commenced by Sebried Dodge, Esq., in October, 1827, and finished in December of the same year.

The commissioners remark:

“From the experience which Mr. Dodge has had as an engineer for three years past, in the actual construction of part of the Ohio Canal, as well as from his science and intelligence, the board are warranted in placing full confidence in the general correctness of his examinations, plans, and calculations.”

They say further:

“The route within this state has been found fully as favorable as was anticipated, and it has been ascertained *beyond doubt*, that the summit as well as the lower levels can be *abundantly* supplied with water.”

Commencing at *Akron*, on the Ohio Canal, the line pursues an eastwardly direction, through the villages of Middlebury and Franklin, and crosses the summit between the waters of Cuyahoga and the Mahoning, about half a mile south-east of the town of *Ravenna*. The line then descends rapidly into the valley of the west branch of the Mahoning river, crosses that stream near its south-westwardly bend, continues along its north branch, recrossing that branch and also the south or main branch, a mile above the junction of those streams; then leaving the immediate neighborhood of the river, the line pursues an eastwardly course, again approaching the river opposite the town of *Warren*, and then continues in the immediate valley of the river, on the right bank, in a south-eastwardly direction, to the line between the states of Ohio and Pennsylvania.

The length of the canal from Akron to the state line is 75 miles and a fraction. The estimated cost of canal, reservoir, and feeders, is \$764,372 88. The canal commissioners say, “The foregoing estimates were made under the immediate inspection and advice of the principal engineer. The amount includes ten per cent. on the nett estimate for unforeseen expenses, and it is believed will fully cover the actual expense of the work.”

Another survey, in reference to the same route, was made under the direction of Colonel Kearney, of the United States Topographical Engineers,† and is published amongst the executive documents of the first session of the twenty-second Congress, vol. vi., document 239.

The length of the canal, as described by him, from Akron to the junction of the Mahoning and Shenango at the head of Big Beaver, is 92 miles and 1575 yards. The main or Cuyahoga *feeder* is 7 miles and 460 yards

\* See Appendix, Document A, p. 1.

† See Appendix, Document B, p. 6.



in length. No general opinion is expressed as to the character of the route, but full confidence seems to be entertained that by the establishment of certain "reservoirs, which, during the dry seasons, may supply the deficiency of those on the summit," an adequate supply of water may be secured. The report furnishes no estimate of probable cost. The line meets the Shenango about 2100 yards above the head of the Big Beaver, whence an aqueduct across the Shenango, (for which the ground is very favorable,) would unite it with the Pennsylvania work. Besides the line now described, another was traced to the valley of the Shenango, above New-Castle. No explanation is given of its object or comparative advantages.

In a letter from the Hon. E. Whittlesey, dated 27th August, 1833, it is remarked:

"Whatever may be said in favor of Rail-Roads, it seems to me that when two Canals are constructed as in Ohio and Pennsylvania, and you wish to connect them, and can do it by constructing a Canal, it is vastly preferable to adopt this mode rather than incur the expense, delay and losses, incident to shifting and storing all kinds of produce and merchandises, and which must be borne, suffered, and sustained if the connection be by a Rail-Road. I do not wish to engender any unpleasant feelings by making any remarks prejudicial to any of the routes that have been examined. I wish the work to go on, and to have the best route for the public selected, and to bury all sectional strife and contention. If the route to Massillon is the best, take it; but if it is not, let it be given up, and take the one from the Portage Summit. This route has been surveyed by a corps of engineers detached by the Secretary of War, by order of the President of the United States, under the act of May, 1824, and favorably reported by Col. Kearney. Lieut. Dumeste, a scientific and experienced engineer, made the survey with great care and he informed me he never surveyed any other line of Canal of the same length combining so many advantages with so few obstructions as the line from Akron, at the Portage Summit, to New Castle, in Pennsylvania. Captain Dodge, one of the Ohio engineers, also surveyed the route, and pronounced it to be favorable."

On the same subject, General Lacock says:

"I am very confident that an estimate of \$12,000 per mile will be sufficient to cover all expenses of making the connection proposed. In this estimate I have exceeded, I think, by about \$2,000 per mile, that of others who had as good an opportunity of judging as myself, but perhaps with less experience in canalling."

He adds:

"The Company incorporated by the State of Pennsylvania, have not yet had sufficient encouragement from any quarter to justify them in opening books and taking other preliminary steps to obtain subscriptions to the stock. They have been fearful lest an abortive and premature attempt to raise the money might be injurious to an improvement the importance of which seems not to have been heretofore appreciated by many of those most interested in the Western trade; but the necessity of a connection with the Ohio Canal is every day becoming more apparent, and forcing itself upon the most sceptical of our eastern friends; and I think the time has arrived when an attempt should be made to induce the State of Pennsylvania to guarantee an interest, of say 4 per cent., for several years, on a portion of the stock, and a similar application made to the State of Ohio. If the two States would embark, in any way, in the improvement, it would give confidence to individuals who have capital, and we should get the necessary funds. The work could be completed in two years as well as in two hundred."



The following letter from General M'Coy, one of the Pennsylvania Canal Commissioners, dated Warren, (Ohio,) September 20, 1833, and published in the Pittsburgh Gazette, will be read with interest. Mr. Clarke is the President of the Board.

"Mr. Clarke and myself are thus far on our way to Conneaut Lake, in Pennsylvania. From New-Castle, at the head of the Beaver Division, we proceeded along the waters of the Mahoning to Youngstown, in Ohio, and from there to Ravenna, where I had the pleasure of meeting with your friend, Mr. Sloan.

Yesterday, Mr. Clarke, Mr. Sloan, and a gentleman residing in Ravenna, of the name of Day, and myself went in a carriage to Akron, on the Ohio Canal. On our way thither, and also on our return, Messrs. Sloan and Day took much pains in pointing out to us the proposed route for the connection; and, from personal observation, as well as from surveys and reports submitted to us by Mr. Sloan, we do not entertain a doubt as to the feasibility of connecting the Beaver Division with the Ohio Canal, at Akron.

The expense of constructing the work, necessary to form the connection, will not, in our opinion, amount to as much as it has taken to construct any portion of the Canals in Pennsylvania, of the same length.

The summit level lies south of Ravenna, about half a mile—it can be supplied with water from four several lakes, that are contiguous to it—also, by feeders from Breakneck creek and the Cuyahoga river.—These sources, I am warranted in saying, will be sufficient to supply the feeders and Canal in seasons of the greatest drought.

To divert the trade from the New-York, into the Pennsylvania Canal, is an object of vital importance.—Pittsburgh and Philadelphia are deeply and peculiarly interested in the matter; and it behooves the business men of those cities to bestir themselves in effecting an object so essential to their future mercantile and manufacturing prosperity."

The friends of this route regard it as presenting many striking advantages.

1. Its comparative cheapness. They contend that not more than one million of dollars will be necessary to connect the Ohio canal with the Beaver work, and that there will thus be opened, even without further expenditure, a communication to Pittsburgh during the business seasons, by means of this cross-cut and the Beaver work; and from Beaver by steam-boat up the Ohio river.
2. A canal, on which a farmer may use his own boat, is asserted to be more acceptable than a rail-road, to the thrifty, ingenious, and adventurous people, for whom the communication is designed.
3. Articles can be transported from the Ohio canal to the viaduct at Johnstown, without breaking bulk; and the same of merchandise going westward. The canal boat which has been traversing the Ohio canal may turn aside at Akron, and make its way to the town of Beaver; from this point it can be towed up by a steam-boat to Pittsburgh; join the Pennsylvania canal; and proceed to the foot of the Allegheny mountain. The boat could there receive a return cargo and transport it to the Ohio canal, dispensing in its *descent* from Pittsburgh to Beaver with artificial aid. Information is derived from a good source that "two canal boats, each carrying from 20 to 25 tons, may be towed up the Ohio river by a small steam-boat carrying passengers, &c. This can be done for \$1 per ton; the freight on keel-boats has been \$1.60."
4. The preceding paragraph contemplates a reliance on the navigation



of the river Ohio. But even assuming, with General Lacock, the ultimate necessity of a rail-road between Pittsburgh and Beaver, still it is contended that the balance of advantages would be in favor of this route. We look, say its advocates, to all the commerce of a canal more than 300 miles in length, the whole of which must *reach* any given point of intersection by means of canal boats: a rail-road at this point would require an immediate and inevitable abandonment of the vehicle of previous conveyance, with no possible chance of resuming it at any subsequent stage of transit. On the *other* route, the boat which traversed the canal may, *to a certainty*, proceed to the river Ohio at Beaver; and thence either be towed up and go on to Johnstown, or—if the state of water forbid—her cargo can be put upon the rail-road, and the boat earn a return freight. Thus, it is only on a contingency that, by the Mahoning route, transshipment will be necessary before reaching the Allegheny mountain; and even with transshipment at Beaver, the route will present greater attractions than the rail-road to Massillon.

5. The state may be induced to lend to this work its countenance and assistance. "Without this improvement," says General Lacock, "the expenditure already incurred, particularly west of Pittsburgh, will be, comparatively speaking, of little account to the state at large. The work is an extension of the Pennsylvania canal; and connected as it stands, with the interest of the state, I see a good prospect of obtaining aid in its completion, and I have no hopes, from that quarter, of assistance to the contemplated rail-road."
6. We aim not only at the commerce of the Ohio canal, but at that of Lake Erie above Cleveland. The termination at Akron keeps both these objects in view. The commerce which ascends the Ohio canal towards the lake, will always have an adequate inducement to turn aside into the cross-cut at Akron, rather than proceed on to encounter the perils of the lake; and, on the other hand, the nearer the cross-cut to Lake Erie, the more likely will it be to attract to itself whatever is afloat on the upper part of that lake.
7. A communication further south, might be turned to the prejudice of the Pennsylvania canal, and subserve rather the National road, or the Baltimore and Ohio rail-road.
8. The advocates of a rail-way urge that it can be used at all seasons, whilst a canal will be closed, during part of the year, by ice. The force of this, however, it is answered, disappears, when we consider that a communication of any kind can be extensively useful, only in connection with the principal work, and that the cross-cut may be used whenever the Ohio canal is navigable.
9. From Cleveland to Sandusky, along the present road, is said to be 57 miles. A rail-road between these points will connect the Ohio canal with the proposed rail-road from Dayton to Sandusky, and attract, it is hoped, a great portion of the trade of the latter to Cleveland, and ultimately to the Pennsylvania canal. The projected rail-road from Massillon westward to Upper Sandusky, to intersect the Dayton and Sandusky rail-road, will, it is said, be ninety miles in length.



It will be seen hereafter, in adverting to the pretensions of rival schemes, how far these claims are controverted, or alleged to be over-balanced.

## II.

Canal from Pittsburgh to Bolivar, on the Ohio Canal, by way of the Ohio river, Little Beaver, and Sandy creek.

On 11th January, 1828, a Company was incorporated by the Legislature of Ohio, under the title of "The Sandy and Beaver Canal," for the purpose of making a Canal from a point on the Ohio Canal at or near the mouth of Big Sandy creek to the waters of the middle fork of Little Beaver at or near New-Lisbon, and thence to the eastern boundary of the State of Ohio at or near the mouth of Little Beaver creek.

The Legislature of Pennsylvania, on the 14th April, 1828, (pamphlet laws, p. 465,) authorized an extension of this Canal "into the State of Pennsylvania, to some point near the Big Beaver, and intersecting the route of the proposed Canal from Pittsburgh to and up the Beaver." It is declared that the Act "shall be void if the said Company does not commence active operations on that part of the proposed canal in Pennsylvania, within the period of five years, from and after the passing of this act." The claim, therefore, to the benefits of the Pennsylvania act is forfeited; but as the whole subject has since been permitted to slumber, it is presumed that the pretensions of this route may yet be assured of a fair and respectful hearing.

Its friends complain that, in Ohio, sectional and private feelings and interests have been at work to obscure the advantages and blazon the difficulties of the undertaking. The imputations thus thrown out, and which draw in question the fairness and impartiality of public functionaries, it were idle here to repeat.

The earliest reference to this work by the Ohio canal commissioners, is believed to be in their report, dated 2d October, 1826.\* The discouraging terms in which it is there spoken of led, it is understood, to the employment, by those interested, of Major Douglas, Professor of Engineering at West Point, to make a thorough examination of the route. The result has been published in pamphlet form.† The deservedly high standing of this gentleman cannot fail to secure to it an attentive consideration.

His report bears date 1st February, 1830, and was prepared as he states, from the notes and observations made by himself, in the year 1828, together with the surveys and measurements more recently furnished to him by the resident engineer.

Major Douglas divides the route into three portions; the *Middle*, the *Western*, and the *Eastern*.

The *Middle*, which is fourteen miles in length, corresponds with the summit level of the Canal, and of course occupies the dividing ground between the waters of Little Beaver and Sandy creek. Commencing on the

\* See Appendix, Document C, p. 14.

† See Appendix, Document D, p. 14, &c.



high ground about a mile and a half west of *New-Lisbon*, it terminates in the valley of the Sandy, two miles below Hanover. The character of this portion is represented as favorable.

The *Western* division continues down the valley of Sandy creek to Bolivar, on the Ohio Canal, a distance of  $33\frac{1}{2}$  miles, over ground presenting remarkable facilities for the projected work.

The *Eastern* division commences at the eastern extremity of the middle division, or summit level, and immediately descends, by a rapid succession of locks, to the level of the middle fork of Little Beaver. It then proceeds along the valley of that stream to the Ohio river, and thence along the margin of the river to the town of Beaver. This division of the route does not exhibit the same striking advantages as the western, but is yet declared to present no very formidable difficulties. The examination and estimates were not pursued beyond the town of Beaver, Major Douglas assuming that the work will here have effected a junction with the Pennsylvania Canal.

The whole distance from Beaver to Bolivar is ninety and a half ( $90\frac{1}{2}$ ) miles. The general summary of cost is as follows:

|                              |                        |                |
|------------------------------|------------------------|----------------|
| Middle division,             | 14 miles,              | \$286,658 91   |
| Western division,            | $33\frac{1}{2}$ miles, | 322,106 85     |
| Eastern division,            | 43 miles,              | 535,202 77     |
|                              |                        | <hr/>          |
| Nett total,                  | $90\frac{1}{2}$ miles, | \$1,143,968 53 |
| Engine Feeder,               |                        | 31,000 00      |
|                              |                        | <hr/>          |
|                              |                        | 1,174,968 53   |
| Contingencies, 10 per cent., |                        | 117,496 85     |
|                              |                        | <hr/>          |
| Grand total,                 |                        | \$1,292,465 38 |

Major Douglas examines, at some length, "the important question relative to the supply of water." He remarks: "The interesting situation and relations of this Canal, regarded as a connecting link between the State improvements of Ohio and Pennsylvania give a high degree of interest to every question of this kind; and as some doubts have been expressed on this subject, it did not fail to engage early and particular attention." The experiments in reference to this vital point appear to have been conducted with great patience and circumspection. On the 29th August the waters reached the lowest limit, and did not begin to rise until about the 1st October. The streams, according to the information given to Major Douglas, had never been known to be so low as in this year (1828). The result was one of entire satisfaction to his mind. After suggesting a scheme for an additional supply by means of an engine feeder, he remarks, "but to show more clearly the grounds of *certainly* upon which this Canal may be undertaken, let us first inquire how far this supply alone, *without* any such addition, would meet the expectations of public convenience and revenue;" and he satisfies himself of the abundance of the supply.

"These calculations," says Major Douglas, "are made upon practical



grounds, and with liberal allowances on all points which involve any doubt." "The summit level being thus provided for, there *can be no doubt* of the sufficiency of water in every other part of the Canal."

By the documents it appears that Mr. Joshua Malin was employed by the Canal Commissioners in the survey of 1826, and also, that the value of his assistance is recognized in the report of Major Douglas. A letter from Mr. M., dated Wheeling, Sept. 7, 1833, contains the following exposition of his views:

"In the year 1824 I was employed by the Ohio Canal Commissioners to survey the Mahoning route, as it is now called, from the Cuyahoga near Akron, by the valley of the Mahoning and Big Beaver to the Ohio river; and in the year 1828 I was employed by the Commissioners of the Sandy and Little Beaver Canal, under the directions of Major D. B. Douglas, and made a survey of the whole line from the Ohio Canal at Bolivar to the town of Beaver. Also in 1831 I was employed by a number of gentlemen of Canton, Massillon, and New-Lisbon, to explore and survey the country between those places, with a view to the construction of a Rail-Road which was subsequently surveyed by Mr. Mitchell. I have thus had opportunities of examining the whole country between the Lake, the Ohio river, and the Ohio Canal. The ground upon either of the routes is not unfavorable to the construction of the works contemplated; but, on the contrary, the Western division of each, which embraces about one half of each line, is remarkably favorable and may be constructed at a cost much below the ordinary cost of such works (except the rails for a Rail-Road which would have to be brought from a distance). The Eastern division of each line as it approaches the Ohio river, will be more costly; the country over which the line would have to be carried presents a more rugged aspect, but at the same time affords abundance of material of the best kind for the construction of Canals or Rail-Roads except the iron, as above stated. With regard to the relative advantages of either route over the others, I have no hesitation in giving it as my decided opinion, that the Sandy and Little Beaver Canal would be a much preferable route to either the Mahoning Canal or Massillon Rail-Road. It would be, in the first place, thirty-two miles shorter than the Mahoning Canal, calculating both from the mouth of the Big Beaver where they meet. It will intersect the Ohio Canal thirty-six miles further south. Consequently it will present a route 68 miles shorter than by the Mahoning Canal from Pittsburgh or Beaver to any point south of the intersection; and yet it will be within four miles as nigh by this route from Pittsburgh or Beaver to Cleveland on Lake Erie as by the Mahoning Canal. Its most northern point will be nearly a degree further south than the most northern bend of the Mahoning Canal; and of course more favorable for early or late navigation. It passes through one of the best portions of the State of Ohio for wheat, bacon, and other heavy produce: the Mahoning is a grazing and cheese-making country, but the principal trade would be with the lower country, including Kentucky, Indiana, Illinois, &c. Boats could, during the whole summer, ascend and descend through the Ohio and Sandy and Beaver Canals with full freight. The Ohio river, for the last two months, has been so low that no loaded boat could ascend to Pittsburgh from the lower country. Another important fact is, that the Canals would be about one hundred miles less distance to Cincinnati than by the Ohio river.

"The Report of Major Douglas has been more fully confirmed by subsequent observation and experience; and the sums therein stated as the cost of the work I am fully satisfied are sufficient to cover all contingencies. My own calculations of the cost were nearly two hundred thousand dollars less; and the recent Reports of the Ohio Canal Commissioners upon the cost of that work, have satisfied me of their correctness. Messrs. — have stated that they had some doubts of the supply of water on the summit level of the Sandy and Beaver Canal. Major Douglas and myself gauged the streams that are calculated on to supply the summit level, during six weeks of the dryest part of the summer of 1828, which was a much dryer season than some years before, at least so stated by the inhabitants of the country, and we have no doubt of the supply, as may be seen by reference to Major D.'s report. Messrs. —, as well as some of the leading gentlemen in Pittsburgh, are largely interested in lands on the Mahoning, or its neighborhood, which may be some reason why they would prefer that route. With respect to Mr. Mitchell's



Report on the Rail-Road, I believe it to be, in the main, correct; but every day's experience and observation are teaching us that a barrel of flour can be transported upon a Canal one hundred miles at one half the cost it can upon a Rail-Road, to say nothing of the transshipment. I believe, too, that the time is not distant when boats will pass, upon a properly constructed Canal, ten miles per hour."

Elderkin Potter, Esq., of New-Lisbon, one of the Commissioners named in the act of incorporation by the State of Ohio, says, in a letter dated 23d August, 1833:

"All observations made have fully confirmed the truth of Major Douglas' report. Two facts not mentioned, and I believe, not then fully known, have been ascertained since his report, which may be deemed important. 1st. A vein of stone-coal is found to exist in the east and west side of the dividing ridge, where the tunnel will be required, of the precise level of the Canal, of  $2\frac{1}{2}$  feet in thickness where it makes its appearance. This would strongly indicate that it passed through the dividing ridge, and if so would very much reduce the expense of the tunnel. 2d. A survey, at my instance, was made of the extent of country drained by the streams of the summit level, (the middle fork of Beaver, from which the engine feeder is supplied, being excluded), and it is upwards of 65 miles. I speak from memory, as I have not now the plat of the survey, but I feel a perfect confidence that I am less than the amount. Compare this with what General Bernard in his report on the Ohio and Chesapeake Canal says, as to the adequacy of 36 miles to supply that summit level."

The region of country traversed by the canal is, in great part, the same with that of the projected rail-road. At the period when the latter was a favorite at Pittsburgh, the friends of the Canal offered to waive their pretensions, and unite in an effort to secure the communication to Massillon. The great struggle, indeed, is between the *northern*, (or Mahoning,) and this which is called the *southern* route; the mode of communication being comparatively of minor interest. As the rail-road has, of late, attracted most attention, and been most strenuously urged, it may be well, in order to avoid useless repetition, to reserve a statement of the advantages which the *two* modes of communication by this route are supposed to possess *in common* over that by the Mahoning.

It is but just, however, to note that a canal here eludes many of the objections, (whether well or ill founded,) which have been arrayed under the preceding head, against a rail-road. The distance from the Ohio canal to steam-boat navigation on the Ohio river, is but 76 miles, whilst by the Mahoning route it is 117 miles, of which 92 are yet untouched. From the mouth of the Little Beaver goods could be transhipped into a steam-boat, or towed up in the canal boat, at a cost which would scarcely be influenced by the distance, (12 miles by river,) between the mouths of Big and Little Beaver. The continuation of the canal to the town of Beaver, presents to view a termination of both works at the same point; and not only is a general comparison of distances in favor of the southern route, but the entire line is found to be shorter than the distance between New-Castle and Akron.

As respects the tolls to be exacted, (aside from the question of distance,) if we assume the expenditure already incurred at Beaver, as half a million, and that of the cross-cut from Akron to New-Castle a million, there is a much larger investment of money to be recompensed than would pass into the southern route. To the western merchant, or farmer, it will, of course, make no difference whether the whole amount of toll be paid to the state, or part to the state and part to an incorporated company.



### III.

#### Rail-road from Pittsburgh to Massillon.

On the 20th of July, 1831, a resolution was adopted, at a meeting of the citizens of Pittsburgh, declaring it important that immediate measures should be taken "to ascertain the practicability of the construction of a rail-road from this city, passing through the town of Beaver to the mouth of Little Beaver; and thence, by the most advantageous route, to the most eligible point of termination on the Ohio canal." A committee of eleven was appointed to carry into effect the views of the meeting. In the towns of Ohio along the contemplated route, much interest was excited, and a liberal contribution made towards the expense of surveys, &c.

The report of the committee bears honorable marks of zeal, intelligence, and industry. Major Douglas had been, in the first instance, engaged to make a survey. He was, however, prevented from attending; but as the committee state, he "formed an exploring party under the direction of Lieutenant O. M. Mitchell, of the United States Topographical Engineers, and E. Ogden, Esq., Civil Engineer, to whom he gave very full and detailed written instructions." The result of the examination appears in a letter from Lieutenant Mitchell, appended to the report of the committee.\* The route down the Ohio river from Pittsburgh to the town of Beaver presented an appearance of such striking aptitude for the purpose "as to render minute examination with the instruments entirely unnecessary." From Beaver to the mouth of Little Beaver creek, along the margin of the Ohio river, no very serious obstacle appeared. Thence it was necessary, without alternative, to pursue the valley of the Little Beaver to the junction of its west and middle branches. Here two routes presented themselves; one by the west branch, connecting with the valley of Sandy creek and terminating at *Bolivar*; the other, by the middle branch to *Massillon*. The instructions of the committee directed that a full examination should be made as to both terminations. Lieutenant Mitchell decided to commence with the middle branch, for the following reasons: 1. The west branch, in connection with Sandy creek, had already been examined by Major Douglas with reference to a communication by canal, and it led, moreover, through a country thinly populated, and upon the line of which little or no stock could be subscribed. 2. The ultimate extension of the route from Bolivar further west, beyond the Ohio canal, seemed, from the nature of the ground, as exhibited by maps in the possession of Lieutenant Mitchell, to be "next to impracticable." The route by the middle branch, on the contrary, would pass through a well-settled region, and enlist the interests and secure the co-operation of many flourishing towns.

The party proceeded, accordingly, up the middle branch of the Little Beaver to New-Lisbon; thence across the country to Georgetown; thence to Canton; thence to Crooked creek, and along its valley to Massillon. Here the labors of the party were terminated by an order from the committee.

\* See Appendix, Document E, p. 24.



The route above indicated, is pronounced by Lieutenant Mitchell to be "one of at least ordinary practicability." The whole distance from Pittsburgh to the Ohio canal is less than 108 miles. The average cost will vary from \$18,000 to \$20,000 per mile.

By an act of the legislature of Ohio, dated 3d February, 1832, there was incorporated "The Pennsylvania and Ohio Rail-road Company," with a capital of two millions of dollars, for the purpose of constructing a rail-road from a point at or near the city of Pittsburgh, to Massillon on the Ohio canal. The act is not to take effect until the legislature of Pennsylvania shall pass a law confirmatory of its provisions.

On the 8th of March, 1833, a bill, giving the sanction of Pennsylvania to this charter, was reported by Mr. Stewart in the House of Representatives, but was not acted on.

At the next session, it was, on motion of Mr. Irwin,

"Ordered, That an item of unfinished business, relative to the incorporation of the Pittsburgh and Massillon Rail-road Company, be referred to the committee on corporations."

On the 30th of January, a petition was presented

"From sundry inhabitants of Pittsburgh, praying for the incorporation of a company for the purpose of making a rail-road or *M'Adamized turnpike*, with the exclusive privilege of using locomotive steam-carriages, from Pittsburgh to the Ohio canal."

This petition is understood to have proceeded from some of the gentlemen who had mainly contributed to the passage of the act of the Ohio legislature. There seems to have been no final action of the legislature of Pennsylvania on the subject.

The considerations which the advocates of this project have urged in its favor are believed to be principally these:

1. The rail-road system enjoys a larger share of general favor and confidence than the rival plan of improvement; and will be more likely to engage the attention of capitalists. After many fluctuations in the public mind, this may, perhaps, be now pronounced the prevalent opinion. A correspondent of the Philadelphia National Gazette of 17th September, 1833, who had just returned from a tour to the west and the north, "made with a view to examine as to the probable course of our trade therewith for the next few years," remarks: "It is *inevitable* that rail-roads must eventually *triumph over every other mode of transportation*. So well satisfied are those companies in Carolina, Virginia, Maryland, Delaware, Jersey, New-York, that have fairly tested the value of locomotive power, that not a shadow of doubt rests on their minds but this class of improvement, combining celerity with economy, must eventually extend in preference to any other."
2. A doubt as to the adequacy of a rail-road strikes at the whole scheme of improvement in Pennsylvania. From Philadelphia to Columbia it is mainly relied on; and the entire business, going and coming, is destined to pass in this mode over the Allegheny mountain.



3. The *whole* distance from Pittsburgh to Massillon is *less than* 108 miles. From the Ohio canal at Massillon, to the Ohio river at the mouth of Little Beaver, is 66 miles. Here the steam-boat may be taken, if we rely on the navigation of the Ohio river; and if, as General Lacoek suggests, a rail-road be the only practicable artificial communication between Pittsburgh and Beaver, the additional distance between the latter and Little Beaver can be of small account, whilst an uninterrupted communication, without intermediate transshipment, would be thereby opened between Pittsburgh and Massillon.
4. The rail-road will lead to a point far below the shoals at the mouth of Big Beaver, and thus ensure a communication with the lower rivers as long as it is enjoyed by places 200 miles below the city. This will be of incalculable importance, not only to Pittsburgh, but in reference to business on the whole line of our public works, which is now liable here to vexatious and indefinite detention, greatly discouraging to the use of the Pennsylvania canal.
3. A rail-road will combine the advantage of increased facilities for travelling; and will consequently give to our turnpikes the greater part of that which now passes through Wheeling to Baltimore, and of that which now seeks Buffalo on the way to New-York.

In a letter from James Duncan, Esq., of Massillon, dated Sept. 2, 1833, it is remarked:

“One of the principal sources of income to a rail-road is found to be the passengers travelling over it. The travel from this country to the Eastern cities is already large and fast increasing; as an evidence of which I will mention the fact, that there are now *twenty-one steam-boats* on Lake Erie, mostly for carrying passengers, and more building. A very great proportion of these boats derive their support from the travel of merchants and others of the western and south-western states to and from the Atlantic cities. And this, over a most circuitous route, in its course, to the amount of some hundreds of miles, and which only for a part of the year, affords reasonable facilities for travelling.

“From Columbus in this state to New-York, *via* Cleveland and Buffalo, is, say in round numbers, - - - - - 820 miles.  
By way of Massillon and Pittsburgh, say - - - - - 610 “

Difference in favor of the latter route, - - - - - 210 miles.

“If the point of destination be Philadelphia, the difference, of course, is greatly increased. And yet in despite of this, with a climate and country in every respect more unfavorable to the construction and maintenance of good roads, with their lakes and canals frequently closed with ice till the middle of May, these New-Yorkers have succeeded in securing to themselves almost the entire carrying business, and more than two-thirds of the travel of Ohio, Indiana, Illinois, and Michigan, and a fair proportion of Western Virginia, Kentucky, Tennessee, &c.

“Is it unreasonable to suppose that a rail-road, connecting the Pennsylvania and Ohio canal, with so great an advantage in distance, warm latitude, &c., would regain to Pennsylvania part of the business and travel that has thus been wrested from it? If a rail-road will not do it, no means of connection can; for be assured that, if we must wait in the spring of the year for the opening of canal navigation before property can be started, without affording some additional facilities for travelling besides those afforded by a devious canal, when property once gets afloat it will pursue the course in which the current now sets so strongly.”

6. A rail-road may be used at all seasons of the year, whilst a canal will be periodically closed by ice. And it is a great error to suppose



that the winter transportation by the rail-road would be suspended even when the Ohio canal is frozen over. Aside from the advantage of forwarding our Pittsburgh manufactures uninterruptedly to market, it is to be borne in mind that at such points as Massillon, New-Lisbon, &c., there is a vast accumulation of produce independent of that work. The *flouring* business would be secured to Pittsburgh, as well as the final passage of the article to Philadelphia. The *Rochester Daily Advertiser* states, that from the 1st of December, 1830, to the 1st of December, 1831, there had been manufactured in that place alone, 242,000 barrels of flour, and that the millers have paid out for wheat, during the same period, \$1,160,000. The season which the farmers greatly prefer for forwarding their produce is the winter. By a rail-road, Pittsburgh could be made to take the place of Rochester. The latter cannot be reached by water from Ohio, (owing to ice in the lake at Buffalo, &c.,) until the end of May; and yet it is now, for the want of a more accessible spot for the purpose in winter, the great depot and seat of manufacture.

7. It is a very short-sighted view of the subject, to say, that *the state* has an interest in urging the Mahoning route, merely *because* there has been an expenditure on the Big Beaver, which may thus be brought into play. The great object is to render the whole line of our works attractive, and to place it in advantageous comparison, as regards the entire route, with the New-York canals. If this be not the general result, our vast expenditure may be considered as, in a great measure, thrown away. To adopt an awkward and circuitous route, for the reason mentioned, is the wisdom of a coachmaker who would construct an unwieldy and cumbrous machine, with a fifth wheel, merely because he happened to have a superfluous one of which no other use could be made.

There will be no difficulty, it is urged, in procuring the requisite sum from private capitalists, when satisfied that a judicious decision has been made. The Philadelphians have manifested no such repugnance, as has been asserted, to trust their money out of their own immediate neighborhood. Look at the history of the Merchants' and Manufacturers' Bank of this city. At the original sale, agents were here from Philadelphia, eager competitors for the stock which now commands a high premium in that market, and the far greater part of which is owned by persons residing east of the mountains. Yet here the timid, suspicious temper imputed to the capitalists of our emporium might well have suggested, that the local sympathies of the managers of the institution, would be adverse to a faithful administration of its affairs, and that the importunity of a necessitous applicant for favors, might be more urgent and efficacious than a sense of duty to the absent stockholder. In reference to the contemplated improvement, there can be no such misgiving.

8. The rail-road will have a more southern termination than the Mahoning canal. This is an important consideration, even aside from the greater productiveness of the counties through which the work will pass. The main source of profitable employment which the cross communication may, *to a certainty*, rely on, is from the region south of the lake shore. Whatever is produced along that shore, or reaches its



immediate vicinity, is in peril of being drawn to the city of New-York.

9. The preceding suggestion equally applies to a struggle for the trade of the proposed exterior line of communication from Dayton to Sandusky. If produce be suffered to reach the latter place, it will be strongly tempted to take the water for Buffalo, or the Welland canal; but if intercepted by a cross-line, running from Massillon westward, in the course indicated by the face of the country, it will, in all probability, be secured to Pennsylvania.
10. While the rail-road passes through so valuable a region in the south, the fact is remarkable that the *entire* route by it from Pittsburgh to *Cleveland* and Lake Erie, is *shorter* than by the Mahoning canal! This is urged as a triumphant answer to the suggestion, (p. xvi., § 6,) that Akron being nearer to Cleveland, a termination at the former place will be more likely to attract the commerce of Lake Erie. The attractiveness depends, it is contended, not on a narrow reference to the mere nearness of the point for turning eastward, but on a consideration of the shortest and most expeditious mode of reaching a given place; and it matters not whether more or less of the distance traversed be along a Pennsylvania or Ohio work.
11. The distance is only 42 miles between *Columbus*, (on a branch of the Ohio canal,) and *Springfield*, through which the proposed Dayton and Sandusky rail-road will pass. It is difficult to believe that a passage will not be forced through this interval, in order to join the Pennsylvania route. The national turnpike, toll-free, between these points, may itself, perhaps, answer the purpose. The more southerly our intersection of the Ohio canal, the greater is, of course, the probability of giving to the trade of the far-west a turn so desirable. By the rail-road, the distance from Pittsburgh to Columbus, Chillicothe, &c., will be about 70 miles less than by the canal to Akron.
12. The counties of Ohio through which the rail-road will pass are richer and more populous than those along the route of the Mahoning canal; and a steady communication with them is of infinitely greater importance to Pittsburgh. The following statement is from a gentleman extensively engaged in business in this city, and who has watched with care the course of western trade. The general reflections into which his communication expands are, also, well worthy of serious attention:

“The amount of business done in this city by the merchants residing in Columbiana and Stark counties, is greater than the whole amount from all the counties composing the Western Reserve—viz., Trumbull, Portage, Ashtabula, Geauga, Cuyahoga, Loraine, Medina, and Huron. How far this may be owing to the circumstance that the counties near to Lake Erie have long had easy access to New-York, and how far a change might in some measure be effected by a canal to Akron, are matters to which you have asked my attention, but on which I am reluctant to speculate without better data. I state the *facts* as known to all our business men. I ought, perhaps, in candor, to add another fact which may afford some countenance to the argument at which your inquiry seems to point. It is this, that the trade of Pittsburgh with the Western Reserve, is principally with *Trumbull* county, which is nearest to us. On the general question—it is well known to all the business men of our city, that the completion of the Ohio canal has turned nearly the whole trade of that state from Philadelphia to New-York, and from Pittsburgh to Utica and Buffalo.



"At one time Philadelphia enjoyed the business of Ohio, to the exclusion of every other rival, and would again enjoy it could she afford equal facilities to the merchants of that state with those afforded them by the New-York and Ohio canals.

"It is also true that a few years ago the city of Pittsburgh furnished a considerable amount of *groceries* to the middle counties of Ohio. Now she furnishes none. The sale of Pittsburgh manufactures is becoming every day more and more restricted, being superseded by similar articles purchased at Albany, Utica, and Buffalo. Nails, iron, and glass-ware, not the manufacture of our city, are to be met with along the entire line of the Ohio canal from Cleveland to Portsmouth.

"A few years ago, for the want of those facilities which she now enjoys of transporting her staple productions to the best markets, the commerce of the state of Ohio, as compared with what it is now that she enjoys those facilities, was inconsiderable. At the period referred to, with the exception of those counties on the Ohio river and along the borders of Lake Erie, the remainder of the state was entirely cut off from a market for any and all descriptions of grain, and as a necessary consequence, the farmers residing in that part of the state were unable to purchase except the mere necessities of life. At the present time the matter is reversed, grain being their most saleable production, and commanding higher prices along the line of the canal, than at any other point. The effect of this is, that the interior counties are increasing rapidly in wealth and population while those on the river and lake improve at a much slower rate. Ten years ago Philadelphia enjoyed the benefit of the whole trade of Ohio, with the exception of a small part from the south-western part of the state, which was directed to New-Orleans, and another from the counties on the lake shore which took the route to New-York. The trade to New-Orleans being an exchange of grain, flour, pork, whiskey, &c., for sugar, molasses, fish, &c., did not affect the trade from the same point with Philadelphia for foreign merchandise, and with Pittsburgh for iron, nails, glass, glass-ware, and her various manufactures. The trade from the counties on the lake shore embraced all their supplies of foreign merchandise in exchange for such articles as would bear transportation to the New-York market. There was, however, a considerable portion of their productions, as cheese, scorehed salts, rags, &c., that were brought to this market and exchanged for nails, iron, glass, and tobacco.

"As the Ohio canal has progressed in its completion to various points until it reached the Ohio river, it has gradually effected an almost total abandonment of Philadelphia by the merchants on its borders and west of it for the more eligible market of New-York. When acquaintances are formed and commercial relations established between business men, it is necessary, in order to induce the making of other acquaintances and formation of other relations, that weighty inducements be held out. These inducements were offered in the cheapness of transporting produce, via the Ohio and New-York canals, to the city of New-York and conveying merchandise home by the same route, and thus while the affections of the merchants of Ohio were with Philadelphia, their interest centered in another quarter, and necessarily drew them to New-York to do their business. Being thus obliged to visit New-York for such goods as they had been accustomed to purchase in Philadelphia it was to be expected that they would look out for a substitute for Pittsburgh to furnish them with such goods as it had been their custom previously to purchase from us, and it is a fact that where formerly Pittsburgh supplied groceries she now supplies none, and even her manufactures of iron, glass, and tobacco, are being superseded with similar articles supplied from other places. Many merchants from Ohio, when passing through our city on their way eastward, inquire the prices of our nails, iron, and glass-ware, but decline purchasing in the expectation of being able to do better in New-York, Albany, or Utica. Whether they can do better is uncertain, but it is a fact that many of them do not purchase here afterwards. One reason for this no doubt is, that by purchasing these articles where they buy the remainder of their goods, their entire stock reaches home about the same time, and they themselves, are not under the necessity of delaying a day or two in this city on their return. With merchants, where no countervailing interest exists, these considerations have weight. But a connection with the Ohio canal enabling us to deliver goods at, say, Massillon for fifty cents per hundred weight less carriage than it now costs, (equal, on heavy goods, to a reduction of ten per cent.,) would in all probability turn the scale in favor of our manufacturers, and secure for the iron of Pennsylvania, in all its various forms, the market of Ohio.



"The recent and continued rise in the value of real estate in the city of New-York, particularly in Pearl street, is another evidence of its rapidly increasing interior commerce.\* It is a fact, not only freely admitted by their jobbing merchants, that a very great proportion of their new business is owing to the completion of the Ohio canal, but so sensible are they of it, that they are now subscribing liberally to other schemes of internal improvement in that state; full confidence now prevailing in regard to a reimbursement for their investment, as well from large dividends as from increased business. Intelligent merchants in Philadelphia now acknowledge the loss of a very great proportion of their Ohio trade. This fact they were unwilling to own, until the unwelcome truth was forced upon their observation by the absence of their old friends and customers at several successive seasons."

The following *fact* is from the Pittsburgh Gazette of 8th October, 1833:

*Something New for the Philadelphians.*—The following receipt was handed to us last night, with permission to use it. What will our friends in Philadelphia think of it? Goods, for Pittsburgh, sent by the New York Canal, Lake Erie, and the Ohio Canal, to Massillon, and thence, by wagons, to this city, cheaper than they can be, as yet, sent from Philadelphia direct!!!

"T. & C. } "Received from Thomas Jessop, in good condition, Two Cases  
"Pittsburgh. } of Steel, weighing 1,426lbs.

"For Messrs. Tasse & Church, Pittsburgh, Pa.—To the care of A. & D. B. McCully, Massillon, Ohio. Freight at the rate of \$1 34 per 100lbs.—delivered at Pittsburgh.

"S. F. ARMSTRONG,  
"Pr. C. P. KILLOGG."

"New York, Sept. 28, 1833."

A letter from Massillon, dated 9th October, 1833, says:

"The transportation through our Canal of southwestern goods, for the last fifty days, and up to this day, exceeds the anticipations of the most sanguine. The receipt of tolls at the Cleveland office, for the month of September, shows an increase over the corresponding period of last year, of about 300 per cent. The travel, too, up the lake, into the western and southwestern States and Territories, is perfectly astonishing. I was at Cleveland last week, and in one day there were landed at that place, from steam-boats, sail vessels, and stage coaches, according to the opinion of the business men of the place, from 1500 to 2000 passengers! This, to be sure, was an unusual number, and may be considered, probably, about three times the average daily arrivals. Will not facts like these open the eyes of your citizens? Or will they vacillate between conflicting opinions, until their neighbors shall secure to themselves the full benefit of the golden harvest?"

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### *Canal to the town of Erie.*

In order to bring under view all the various topics that enter, occasionally, into the discussion of the subject before us, it may be well to advert to the canal at one time contemplated, having its termination at the town of Erie. Some degree of sensitiveness has been manifested by a portion of our fellow citizens in the north-western counties of the state, who begin,

\* Some idea of the value of real estate in Pearl street may be inferred from the fact, that *all* the stores now erecting are five stories in height, and the rents of four and five story warehouses, in the business part of the street, vary from \$3000 to \$5000 per annum.



it may be feared, to look with positive dislike on the Ohio connection, which they at first treated as a work useful certainly but to which, as they thought, inordinate importance had been attached. A fierce spirit of controversy is here so wholly out of place that it is anxiously desired to state, as calmly as possible, the reasons for believing that the work to Erie would not secure the trade for which we are struggling with powerful competitors. In the report of the canal commissioners, of December, 1830, it is said:

"The construction of a canal or slack-water navigation, from the mouth of Beaver creek to a point near New-Castle will be of importance to a considerable population. At one end it will be connected with the Ohio river and form a line of communication *common* to the meditated canal to Erie, *as well as with the canal proposed to be extended from New-Castle to the Ohio canal.*"

On these representations half a million of public money passed into this work. Let us now suppose the *two* objects which the state intended to subserve presented, with all the aid of subsequent developments, to the rigid scrutiny of capitalists about to make an investment. This view of the subject is suggested by no spirit of jealousy or unkindness, but in bare justice to the great interests at stake.

The region through which the work to Erie will pass, on any route, is thinly settled, and presents in itself nothing to warrant the undertaking. It can only, therefore, claim attention as a thoroughfare between the further west and the seaboard.

The merchandise destined for the Ohio river, and the return produce, will, of course, be completely out of its range.

The manufactures at Pittsburgh never could sustain the charges attendant on seeking a market by the way of Erie, over a canal of necessarily great and expensive lockage, a transshipment at Erie, another transshipment at Cleveland, and an ascent up the Ohio canal.

Cut off, then, from these sources of employment, it remains to inquire whether the vast business of the Ohio canal will find its way to Erie, and whether merchandise from the eastward will be likely to make that place a point of embarkation.

For produce already afloat on the lake two avenues are now open; one at Buffalo, through the whole length of the New-York canal; the other through the Welland canal, either to Montreal, or along the southern shore of Lake Ontario to Oswego, thus avoiding the intermediate charges. The great reduction of tolls which has taken place in consequence of this state of things, leaves Erie without adequate attractions to interrupt the course of lake navigation, after it has so nearly reached a higher point of destination. It has been ascertained that the following article from the Albany Argus of September 9th, on the subject of tolls, &c., is from a perfectly authentic source:

"The canal board, at its session in March last, made a reduction in the rates of toll, which upon flour, salted beef and pork, butter, cheese, and all agricultural productions, going towards tide-water, was equal to 29 per cent. upon the former rates. A reduction was also made upon merchandise, and most other articles going from tide-water, which was equal to 14½ per cent. An average of these reductions would give a fraction less than 22 per cent.; but as merchandise pays a large share of the tolls, and as the reduction upon it is only 14½ per cent., it is perhaps fair to



assume that the reduction in the rates of toll made by the canal board, would not vary much from an average of 20 per cent. This 20 per cent. upon the amount of tolls already collected, would be equal to \$158,600. If we add this sum to the increase of tolls, notwithstanding the reduction, it gives a total of about \$316,000. We are inclined to infer from this data, although entire accuracy is not attainable at this time, that the articles transported upon the canals have increased about one-third, compared with last season.

"It is only necessary to glance at the map of the United States, and to be informed of the numerous channels which are opening to that immense country, which is to crowd the Erie canal with its products, and the merchandise for the supply of its numerous and rapidly increasing population; to be convinced that the capacity of that canal for transportation must be speedily and greatly increased. We are informed that goods, coming from New-York, have been shipped the present season from Albany, to Galena, Pekin, Peoria, and Lower Alton, in the state of Illinois; to Paris, Maysville, Petersburg, Louisville, and Lexington, Kentucky; to Chicago and Green Bay, Michigan territory; to Fort Wayne, via the Maumec, Indiana; to Nashville and Clarksville, Tennessee; to St. Louis, Missouri; and to Florence, Alabama. This information is derived from one of the forwarding lines, (the Merchants'), and embraces only the places to which that line had shipped goods: there are several lines engaged in transporting goods to Ohio and the other western states, whose shipments have been referred to, but we have given points in six states beyond Ohio, which are reached by goods transported through the Erie canal.

"The goods transported to the remote places which we have given, are, of course, light goods, and these in small quantities. But the ascertained fact, that light goods can be transported from the city of New-York, through the Erie canal, to the borders of the Mississippi, with the present rates, must show satisfactorily that when the rates of toll upon the New-York and Ohio canals, are reduced 25 per cent. upon merchandise—that large quantities will be transported where only small parcels are now carried, and that the increase of business upon our canals from this source, will keep pace with the wonderful increase of population in the western states.

"The reduction of 25 per cent. upon the toll on merchandise, will take place on our canals, as we understand a majority of the canal board are in favor of the measure, and the resolution only waits the formal sanction of the board. This resolution, like that which preceded it, will doubtless increase the aggregate amount of tolls, by inviting more distant regions to use the canal as a channel through which to obtain their supplies."

With regard to merchandise going westward, it is obvious that so far as the work to Erie may supply to the New-York canal, as it in fact would, a continuation to the Ohio river, it will be prejudicial to the great line of Pennsylvania works. Will it, on the other hand, supersede that canal to any great extent? The most sagacious observers and experienced men of business declare, that a termination on the Ohio canal *will*, but that one at Erie will *not*, produce such a result. And this for the very reasons which have been urged against Buffalo. The cross-cut will carry goods, at once, into the very midst of the most valuable customers; and every one in the further west is aware that the harbor of Cleveland is open several weeks earlier than that of Erie. The latter has an advantage over Buffalo in this respect, but not so decided as to enable a perfectly sure calculation to be made, as in the case of Cleveland. At Sandusky, at the mouth of the Maumee, at Detroit, it is known, *to a certainty*, that the storekeeper who has his goods at Cleveland, ready for the opening of the lake, will have a long and decisive start over him who relies on Buffalo or Erie. The advantage is too obvious and inevitable to be disregarded.



The Hon. E. Whittlesey on this subject remarks:

"It may be said the route to Erie will engross the trade of which I have spoken, and that this improvement supersedes the necessity of constructing a canal from the Portage summit to New-Castle. The error of this suggestion will be discovered by presenting two considerations. 1. The cross-cut canal would engross much of the commerce of the Ohio canal, which would not find its way to any market in Pennsylvania, if it once descended from the summit to the lake, or, if a part of it should, it would be taxed with lockage and transportation to Cleveland, transportation by the lake to the termination of the Pennsylvania canal, storage and transportation to the Coneaut summit. 2. *The lake is open at Cleveland from 15 to 25 days earlier in the spring than it is at Erie.* I have no objection to the Pennsylvania canal being terminated at Erie, but I say that it will secure only a *very small* part of the commerce of Ohio, and not as much of the north-western trade as a cross-cut canal would. The cross-cut canal, moreover, opens at once to Pittsburgh, an extensive market for her glass, iron, and other manufactures.

General Lacock, in a letter of 12th of September, 1833, uses this strong language:

"The idea of securing the trade of Ohio and the western lakes, by means of a canal to the town of Erie, is delusive and visionary. If the produce of the west reaches that place by vessels on the lake, *Pennsylvania has done with it forever*; comments on this subject are useless; look at the map."

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One mode has already been adverted to, in which the state may aid the proposed connection, viz., the guaranty of a certain per cent., for several years, on the stock, as in the case of the Union canal, by acts of 29th March, 1819, and 26th March, 1821. Another plan would be a direct subscription to be paid either at once or *pari passu* with that of private stockholders. The subscription on the part of the United States to the Chesapeake and Ohio canal, by act of 24th of May, 1828, is thus guarded; "nor shall any greater sum be paid on the shares so subscribed for, than shall be proportioned to assessments made on individual or corporate stockholders." A provision somewhat similar accompanies the aid afforded by the commonwealth of Pennsylvania to turnpike roads and bridges. The advantage of this is, that whilst substantial assistance is given by the public, and the commonwealth has due weight in the management of affairs, the vigilance and caution of private interest are also enlisted to watch over expenditure; and applicants do not approach the legislature for aid without having previously given decisive proof of the sincerity of their own belief in the value and productiveness of the contemplated work.

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In closing these remarks, it may be repeated, that the object of the writer has been—even at the expense of tediousness—to collect materials which may aid inquiry, and conduce, in the end, to a satisfactory decision, rather than to urge the claims of any particular project. The interests at stake are of sufficient magnitude to insure an adequate investment, when capitalists are satisfied that they have been dealt fairly with, and a



survey of the *whole* ground submitted to them. It would have been a far easier task—and one more likely to attract attention and favor—to fall in with the eager interests and wishes of a party, than to do that with which all mere partisans, it is probable, will be dissatisfied. The writer has no interest in the question beyond that of any other citizen of Pittsburgh. The difficulties which he experienced in getting at the facts, and comprehending the points really at issue, suggested the present publication. It is submitted for what it is worth; but with the hope that it may, at least, tend to bring a discussion, heretofore loose and desultory, within definite limits, and that the decision which must speedily take place may not be left, as in too many of our undertakings, to accident or caprice, but be controlled by a dispassionate and enlightened forecast.







## DOCUMENTS.

( A )

*So much of the Report of the Ohio Canal Commissioners as relates to the proposed communication between Pittsburgh and the Ohio Canal:*

### "IN RELATION TO THE PENNSYLVANIA AND OHIO CANAL."

THE survey and location of so much of the route of this proposed Canal, as is within the limits of this state, was commenced by Sebried Dodge, Esq. in the month of October, and finished in the month of December last.

From the experience which Mr. Dodge has had, as an Engineer for three years past, in the actual construction of part of the Ohio Canal, as well as from his science and intelligence, the Board are warranted in placing full confidence in the general correctness of his examinations, plans and calculations. The shortness of the time employed in these surveys precluded the possibility of ascertaining, with minute accuracy, all the topographical facts, of minor importance, connected with the location. Still; however, enough has been ascertained to determine the practicability of the proposed work, and to afford data for estimates on its cost, which cannot vary very materially from the truth.

The route within this state has been found fully as favorable as was anticipated; and it has been ascertained beyond doubt that the summit, as well as the lower levels, can be abundantly supplied with water.

Commencing at the village of Akron, where the proposed Canal will unite with the Ohio Canal in a large and commodious basin, the line pursues an eastwardly direction, crossing the Little Cuyahoga in the village of Middlebury; thence in a northeastwardly direction through the township of Tallmadge until it approaches near the main Cuyahoga at the centre north and south road in the township of Stow, thence continuing nearly the same general course along the south and southeast bank of that river until it passes the village of Franklin, it enters the immediate valley of the Break-neck creek or south branch of the Cuyahoga, and passing up that valley in an eastwardly course, it crosses the summit between the waters of the Cuyahoga and Mahoning branch of the Big Beaver about half a mile southeast of the village of *Ravenna*. The line then descends rapidly into the valley of the west branch of the Mahoning river, crosses that stream near its southwestwardly bend, continues along its north bank, re-crossing that branch and also the south or main branch a mile above the junction of those streams; then leaving the immediate neighborhood of the river, the line pursues an eastwardly course, again approaching the river opposite the village of Warren, and then continues in the immediate valley of the river on the right bank in a southeastwardly direction to the line between the States of Ohio and Pennsylvania.

Some deep cutting occurs in the swamp near the village of Middlebury: the whole extent in length which exceeds proper cutting is upwards of a mile, the average depth of about  $12\frac{1}{2}$  feet. An embankment of con-



siderable magnitude is necessary to sustain the level of the Canal across the valley of the Little Cuyahoga in the village of Middlebury. The greatest elevation of this embankment is twenty feet to bottom of Canal; the whole will contain about 34,000 cubic yards.

The object in view in the location of this part of the line, was to adopt such a level as would preserve a proper medium between excessive deep cutting on the one hand, and of too high an embankment on the other; one or both of which difficulties to a greater or less extent it is necessary to encounter.

After leaving the village of Middlebury the line passes over a tract of uneven and in some places steep sideling ground, for about one and a half miles, requiring some deep cutting and considerably extensive embankments across ravines or on side hills. The earth is however of a character to be easily removed, and is of a good quality for canalling.

Continuing thence northeastwardly, the face of the country and elevations are remarkably well adapted to make a cheap and safe Canal, until the line approaches the Cuyahoga in Stow. Between Stow and Franklin the line passes along a side hill sloping northwardly toward the river; in some places steeper than could be desired, in others nearly level or sloping so gently as to present a very favorable location. This part of the line is intersected by several ravines, two or three of which are of considerable depth; and one, the valley of Plum creek, is six chains in breadth, requiring a large embankment.

Near the village of Franklin a small amount of sand-stone rock excavation will occur. As the slope of the ground is here very gentle, affording an opportunity of choosing the location, a large amount of rock excavation may be avoided, although the rock approaches near the surface.

It is proposed to cut down the summit near Ravenna twenty-seven feet at the highest part of the ridge. The whole extent of the deep cut at this place will be sixty-six chains in length, and its average depth below the natural surface seventeen feet and eighty hundredths. As the length of the deep cut is not great, and the earth appears favorable for the operation, it is even questionable whether good policy will not require reducing the summit level still lower. Every foot of reduction in the elevation of the summit will of course save double that amount of lockage, will aid the supply of water by diminishing the expenditure, and will afford greater facilities for the construction of feeders and reservoirs.

The only difficulties encountered between the summit level and the state line worthy of notice, are the wash banks, which the river on one side, and the hill or table land on the other, render it impossible to avoid.—These banks necessarily enhance the expense of construction and increase the danger to which the Canal will be exposed when made. The aggregate length of these banks is not greater than must ever be expected in following the valleys of rivers—nor is their character peculiarly unfavorable. It is estimated that the united length of banks requiring to be protected against the current of the river will be two miles and forty-seven chains.

It is proposed to supply the summit level of the Canal with water by the following means:

1st. *By a feeder from Breakneck Creek.*—This stream may be introduced by a feeder of three miles six chains in length, and is sufficient for the supply of the summit level and the contiguous levels, in ordinary sea-



sons, during more than half the year. In the dryest seasons, when the flow of water is reduced to the least quantity, it yields about two hundred and forty cubic feet per minute. The quantity of water in this stream may be considerably increased during dry seasons, by using the lake at its head as a reservoir; retaining its waters in the wet season and letting them flow in the dry.

2d. *By forming reservoirs of four lakes or ponds situated near the summit.*—These bodies of water, Muddy Pond, Sandy Pond, Brady's Lake and Lake Pippin, may easily be converted into valuable and convenient reservoirs for the supply of the summit and the adjacent levels. The two former will contain an area of about two hundred and forty acres, when the water is raised to the contemplated height. Water to the depth of twenty feet, or even more, may be accumulated, retained and drawn off from these ponds for the use of the Canal, and conducted into it by means of a feeder of seventy-eight chains in length. A depth of eight or ten feet of water on the area of Brady's Lake and Lake Pippin, may be made available to supply the Canal in dry seasons. These two lakes will together contain an area of about two hundred and seventy acres. The two former ponds may be filled with water to any desirable height, by conducting a branch of the Breakneck into them by a short feeder, and the two latter by means of the proposed feeder from the main Cuyahoga.

It is computed that three hundred and twenty-five million cubic feet of water may be reserved for use in these reservoirs, which will admit a uniform flow into the Canal of upwards of eleven hundred cubic feet per minute for two hundred days, before it will be exhausted.

3d. *By a feeder from the main Cuyahoga.*—The waters of the main Cuyahoga may be conducted into the summit level of the Canal by a feeder seven miles sixteen chains in length. The quantity of water running in the river at the place from whence this feeder is to be taken, may be computed at from 2,800 to 3,000 cubic feet per minute in the dryest season.

Although the waters of the main Cuyahoga alone are probably sufficient to supply the summit level of this Canal and the lower levels dependent on receiving a supply from the neighborhood of the summit; still it is desirable to draw only so much water from the Cuyahoga as may be absolutely necessary, and to rely as much as possible on the other sources. Vast injury must result to the owners of mills, manufactories, and mill privileges, and to the country, to which the water power of the Cuyahoga is of incalculable value, from diverting into any other channel a considerable portion of its waters in dry seasons.

In descending eastwardly from the Ravenna Summit, a small supply of water may be obtained from the west branch of the Mahoning, about three miles from the summit; and as the Canal descends the valley of that stream, its accumulated waters, with that which has escaped from the Canal by leakage, may be brought into the Canal. About twenty miles eastwardly from the summit it is supposed that a feeder from the Silver creek, the most durable branch of the Mahoning, may be introduced; and at Warren the whole volume of the Mahoning river, in dry seasons may be brought into the canal, if desirable.

By an economical and proper use of the means of supplying the Canal with water, above described, it is confidently believed that it will not be necessary to divert from their natural course any considerable part of the waters of the Cuyahoga.



The length of the line of this Canal, as located, within the state of Ohio, is as follows:

|   |                     |
|---|---------------------|
| From Akron (Portage Summit of the Ohio Canal) to<br>Ravenna Summit, | 22 miles 79 chains. |
| From Ravenna Summit to Warren,                                      | 28 " 16 do.         |
| From Warren to Pennsylvania line,                                   | 24 " 58 do.         |

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Total length of Canal line, 75 miles 73 chains.

|                          | <i>Length of Feeders.</i> |
|--------------------------|---------------------------|
| Cuyahoga Feeder,         | 7 miles 16 chains.        |
| Muddy and Sandy Pond do, | 78 do.                    |
| Breakneck Feeder,        | 3 do. 6 do.               |
| Warren do.               | 12 do.                    |

Total 11 miles 32 chains.

---

Aggregate length of Canal and Feeders, 87 miles 25 chains.

*The estimated cost of Canal and Feeders is as follows:*

|   |              |
|---|--------------|
| Cost of main Canal from Akron to the Pennsylvania<br>line, is                           | \$683,762 69 |
| Feeder from the main Cuyahoga, including Reservoirs<br>at Brady's Lake and Lake Pippin, | 50,932 95    |
| Reservoir and Feeder from Muddy and Sand Lakes,   | 20,249 24    |
| Feeder from Mahoning at Warren,   | 4,031 00     |
| Breakneck Feeder,   | 5,397 10     |

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Aggregate cost of Canal, Reservoir and Feeders, \$764,372 98

The foregoing estimates were made under the immediate inspection and advice of the Principal Engineer. The amount includes ten per cent. on the nett estimate for unforeseen expenses, and it is believed will fully cover the actual expense of the work.

|   |                     |
|---|---------------------|
| The total ascent from the Portage to the Ravenna<br>Summit, is        | 101 feet,           |
| Total descent from the Ravenna Summit to the<br>Pennsylvania line, is | 242 13-100ths feet. |

---

Whole amount of Lockage, 343 13-100ths feet.

To overcome this rise and fall, there have been located 36 Locks, of which 11 are west and 25 east of the Ravenna Summit.

Of the commercial importance of this Canal, when finished, no doubt can be entertained by those who understand the interest, and geography of our country; the route passes through one of the best settled and most wealthy districts of our State; and when executed, it will, together with the Ohio canal, open a direct and convenient channel of commerce between the interior of Ohio, and the great manufacturing and commercial city of Pittsburgh, together with the whole West Pennsylvania. Between these sections of country an extensive and highly beneficial commerce now exists, which must increase with the growing population of our common country, and with the development of its resources.

It is however only by looking forward to the time when the Great Pennsylvania Canal, in the construction of which, that state is now engaged, and the contemplated Chesapeake and Ohio Canal shall have connected the



Chesapeake with the Ohio river, the Potomac and the Delaware, that the importance of the Pennsylvania and Ohio Canal can be duly appreciated.

When these great works shall have been executed, the farmer in the centre of our state may put the productions of his fields on board a boat which will convey them to Washington, Alexandria, Baltimore or Philadelphia without unloading or re-shipping; and the merchant may bring his goods from either of those cities to his own door, without risk or change in the method of transportation, and for an expense not exceeding one third of the present cost.

Through the northern part of the *Ohio Canal*, the proposed *Pennsylvania and Ohio Canal*, and the *Chesapeake and Ohio* or the *Pennsylvania Canal* a direct intercourse between the great lakes of the North West on the one hand, and the Delaware and Chesapeake Bays and Atlantic Ocean on the other, will be carried on to an immense extent.

To the interests of Pennsylvania, and of those engaged in the Chesapeake and Ohio Canal, as well as to Ohio, the proposed Canal is of the first importance. It is the most advantageous route between Pittsburgh and Lake Erie—the most direct from the western parts of Lake Erie, Detroit, and the North Western Lakes to Pittsburgh, Philadelphia and Baltimore—it unites with the navigation of Lake Erie, at a point further west and longer clear from obstruction by ice than any where in Pennsylvania; and above all, it intersects the Ohio Canal before it strikes the Lake, and by that means precludes the necessity of transshipment, and avoids the danger of lake navigation as it respects the commercial intercourse between the state of Ohio and the ports of the Delaware and Chesapeake.

Should the Pennsylvania and Ohio Canal be completed we shall see an active commerce carried on between the city of Pittsburgh and the western part of Pennsylvania, on the one hand, and the country bordering on the Ohio river below the mouth of the Scioto on the other, through that Canal and the Ohio Canal during those seasons when the water in the upper part of the Ohio river is too low for steam boat navigation.

The profit of this work to the proprietors must be commensurate to its commercial importance; and it is believed to offer one of the best opportunities for a profitable investment of capital that can be found in the United States.

Respectfully submitted,

ISAAC MINOR,  
BENJAMIN TAPPAN,  
N. BEASLEY,  
JOHN JOHNSTON,  
ALFRED KELLEY,  
M. T. WILLIAMS,  
A. BOURNE.

Columbus, Jan. 17th, 1828.



( B )

*Report of the Survey of the Canal Route from the Akron Summit of the Ohio State Canal to the head of Big Beaver River.*

OFFICE OF TOPOGRAPHICAL ENGINEERS,

Washington City, May 4, 1832.

SIR: In obedience to orders, I have surveyed the country between the Akron summit of the Ohio State Canal and the head of Big Beaver River in Pennsylvania.

This survey was made with a view to the location of a canal which, following the valley of the Mahoning, should unite the Cuyahoga and Tuscarawas canal in Ohio, with that proposed by the valleys of the Ohio river, and Big Beaver and Shenango, in Pennsylvania.

The maps, profiles, and tables, which accompany this report, and of which the following is a list, exhibit, with the minuteness of detail observed in the field notes, all the information collected during the survey, to the extent contemplated by the orders under which I acted.

*List.*

Four sheets of maps, and five of profiles—three books of tables collated from the field notes. These show the magnetic bearings of every line traced during the survey of the canal, and its feeders; their length; their distance from determinate points, and from the streams or hills near them; the comparative altitudes of all the points of the survey, as also their altitude above Lake Erie; their distances (vertically) from the streams, and from the top and bottom of the bluffs near them; the heights of the freshets at different points of the line; the transverse slopes of the ground; the quantity of the excavation; the growth of timber, as it regards grubbing; transverse sections of the streams crossed by it, or at which dams are required; together with such other notes, memoranda or information as is deemed necessary to elucidate the maps and profiles, or aid the formation of the projects and estimates.

A canal departing from Akron, in the State of Ohio, and traversing in its course the valley of the Mahoning river, would necessarily be located south of the Cuyahoga. It would derive its principal supply of water from the Cuyahoga, and its summit level should be traced in conformity with that object. My surveys show that a plane 503 feet 2 inches 63 above Lake Erie, the summit of the canal, would have a position in which, with a feeder of six inches slope per mile, it might receive the waters of the Cuyahoga from a point at or east of Mason's mill, in Shalersville.

Assuming this altitude, then, the summit would, according to the survey, be seven miles and three hundred and ninety-eight yards long. From the eastern termination of the summit to the junction of the Mahoning and Shenango, at the head of Big Beaver, the canal would be sixty-seven miles and fifteen hundred and eight yards long; and, from the western termination of the summit to Akron, 17 miles and 1,429 yards—in all, ninety-two miles and fifteen hundred and seventy-five yards: and the main, or Cuyahoga feeder, would be seven miles and four hundred and sixty yards in length.

The descent westwardly to the level of the Ohio canal, at Akron, would



be 107 feet 4 inches 63. From the summit westwardly to a point on the left bank of the Shenango, at which the line would unite with the route which I formerly traced by the valley of Big Beaver, the descent would be 283' 10" 31"—and the total inclination of the Cuyahoga feeder would be three feet seven inches.

When completed, the canal will not probably be so long as is here stated, for the survey having been made with the view of determining the position of the planes, with reference mainly to the supply of water, and to the general direction of the route, was (habitually) in the centre of the cutting of the canal, and, consequently, often the longest line between the points of lockage; whereas, on the contrary, the final location, contemplating always the principles of economy which should enter into the execution of the project, would adopt the shorter lines, which a judicious system of embankment and excavation would indicate.

To supply the canal with water, we may use Congress lake, Sandy lake, and the Cuyahoga river, for the summit level. The waters of the Mahoning river, and its tributaries, for that part of the line which (lying east of the summit) occupies the valley of the Mahoning. For that part of the line which lies west of the summit, towards Akron, we may use Muddy lake, Brady's lake, and the pond at Burnham's, rejecting from our estimates the Little Cuyahoga, because the supply that may be reserved for this division, may, without its aid, be at all times abundant.

Of these, the Cuyahoga river, Breakneck creek, and the Mahoning and its tributaries, only, are constant sources of supply. Congress lake, Sandy lake, Muddy lake, Brady's lake, and Burnham's pond, are reservoirs.

From the tables hereto annexed, we infer the quantity of water which, during the driest seasons of the year, these streams may yield. Taking the lowest number in these tables, the minimum from the Cuyahoga river,  $=30$  cubic feet multiplied by  $60=1,800$  cubic feet per minute.

From the Mahoning, at Warren, 2,737 cubic feet per minute.

From Big Meander creek, below Warren, 45 cubic feet per minute.

From the Crab creek, also below Warren, 20 cubic feet per minute.

In all, four thousand six hundred and two cubic feet of flowing water per minute—a quantity which, there is reason to believe, may not vary far from the truth.

Assuming, then, agreeably to the calculations of the Board of Internal Improvement, that a Canal of forty feet of average breadth at the water line, and carefully constructed, may be estimated to waste, by filtration and evaporation, 58.13 cubic feet of water per mile per minute, the summit and eastern division being about seventy-five miles long, would require, beside that necessary for lockage, about four thousand three hundred and sixty cubic feet of water per minute, the difference between which, and four thousand six hundred and two, would be two hundred and forty-two cubic feet—a quantity barely sufficient to compensate the waste of the feeders.

It is evident, therefore, that, during part of the year, water for the passage of boats through the locks, must be drawn from the reservoirs above the place of the summit level; these, exclusive of the feeders from them may be formed at a small expense.

Congress lake discharges itself into Breakneck creek. It occupies a much higher level than Sandy lake, and might be made tributary to it by a dam across Breakneck and a feeder.

Sandy lake, which is situated on the left bank of Breakneck creek,



might be connected with the summit by a feeder three miles and eight hundred and fifty four yards long.

These, converted into reservoirs, might contain 173,966,048 cubic feet of water; that is to say, Congress lake reservoir, 72,741,420 cubic feet, and Sandy lake reservoir, 101,224,628 cubic feet. The water at Breakneck creek, at its lowest stage, would probably be equal to the filtration and evaporation of the feeders connected with it.

It is estimated that a lock of the dimensions of those of the Pennsylvania and Ohio canals, of which this line is to be a connecting link, and of eight feet lift would require 13,500 cubic feet for the passage of each boat; therefore, those two reservoirs would yield enough to pass 12,886 boats from the summit of either direction of the canal, or 6,443 boats through both chains of locks—each effecting the passage of the summit without concert.

The division of the canal west of the summit level, will require daily, for filtration and evaporation, 1,548,583 cubic feet of water. Excluding from our estimate Breakneck creek, which belongs to the summit, and Little Cuyahoga, near Middlebury—the water of which may be considered to be too important to the establishment at that village, to be diverted from them without an urgent necessity, there can be found no stream of consequence upon this division of the line.

It becomes necessary, therefore, to establish reservoirs which, during dry seasons, may supply the deficiency of those of the summit. This may be done at but little cost at Brady's lake, Muddy lake, and at the pond near Burnham's. These may be made to contain, above the highest plane of the western division of the canal, water sufficient for filtration and evaporation during a period of ninety-six days; that is to say—

|                           |                        |
|---------------------------|------------------------|
| 1. Brady's lake reservoir | 64,293,898 cubic feet. |
| 2. Burnham's reservoir    | 27,244,078 "           |
| 3. Muddy lake reservoir   | 57,633,066 "           |
|                           | <hr/>                  |
| Total                     | 149,171,042 "          |

The first and second of these reservoirs would be filled by the surplus waters of the Cuyahoga river, (in rainy seasons,) directly from the main and summit level. The feeder from Burnham's would be three miles and one thousand and twenty-four yards long, receiving in its course, a feeder of eighty-six yards in length from Brady's; united, these will enter the canal previous to its passage of Breakneck creek.

Immediately west of Breakneck creek, the canal may receive a supply from Muddy lake reservoir, by a feeder three miles and sixteen hundred and twenty-six yards long, traced by the left bank of the Breakneck.

Muddy lake, which is situated near Sandy lake, and on a lower level than it, would be filled by the surplus water flowing through Sandy lake reservoir.

The maps and profiles which accompany this report, will show, in detail, the position of all these reservoirs in relation to the canal, and the routes by which water may be conducted to them, and thence to the canal.



## GENERAL DESCRIPTION OF THE LINE OF CANAL.

*Summit and Western Division.*

Previous surveys had determined that a point in the ridge, south-eastwardly of Ravenna, was the lowest by which a canal could be traced to unite the valleys of Cuyahoga and Mahoning rivers. This, which our surveys have shown to be 522' 8" 17''' above Lake Erie, is susceptible of being lowered 19' 5" 54''' feet, by a cut of about one thousand and thirty yards in length, and fifteen and a half feet in depth, to the plane here assumed as the summit level.

The summit would commence on the eastern side of the ridge, and, having cut it, would, upon favorable ground, pass westwardly towards Breakneck creek, having Burnham's pond (between the 4th and 5th miles) on the south, and Brady's lake (near 7th mile) north of its course. Descending from the vicinity of Brady's lake, 16 ft. 6 in. 73 feet, it would cross Breakneck creek about one-half a mile above Woodward's hill. To preserve this line, deep cutting of some extent would be required between the 5th and 7th miles. A longer line, however, upon ground of easy excavation, might be followed upon the trace of the feeder of Burnham's reservoir nearly: but such an arrangement would require a branch from the Cuyahoga feeder to Brady's lake.

Sustaining the same level by which the passage of Breakneck creek is effected, (allowance only being made for an inclination sufficient to conduct the water,) the line would reach the left bank of the Cuyahoga, opposite the village of Carthage, between the 9th and 10th miles.

Following the left bank of this river, it would cross Plank creek, and, near Woolcott's mill, it would leave the valley of the Cuyahoga river, turning southwardly towards Middlebury; near the 21st and 22d miles it would descend 43 ft. 0 in. 90 feet, to cross the Little Cuyahoga, whence to the 23½ mile it would preserve that level, and descend then through the ravine of Mill run to the Akron summit of the Ohio State canal, 47 ft. 9 in. to centre of cutting. The prolongation of this line to lake Erie, at Cleveland, is, by the Ohio canal, a distance stated at 38 and a half miles.

*Eastern Division.*

The summit level having followed the left bank of Burnside's run for a mile from the deep cutting, namely, to the eastern termination of the summit, the line should then leave the valley of that run, and descend (by the most direct route through a ravine) 63' 9" in. to the right bank of the west branch of the Mahoning river. Crossing immediately the Mahoning, it would, throughout the remainder of its course, occupy the left bank of that stream.

Proceeding upon the level last indicated, across a point of land which makes deep into the bend of the river, it would (near the 2d mile from the summit) continue to descend towards the bed of the Mahoning, 32 ft. 6 in. 00,) with the view of receiving from that stream, if it should be thought expedient, whatever water it might be capable of supplying. Maintaining the last mentioned level, viz. 63 ft. 11 in. 63 below the summit, the line would cross Hinkley creek at the 3d mile from the summit; hence, pursuing the slope of the hills to the 6½ mile, it might descend 24' 8", and here re-



ceive the waters of the Mahoning, if this point of communication should be preferred to that last mentioned.

Continuing hence to follow the slope of the hills, it might again descend 33 ft. 1 in. 50, near Stanley's mill, the point on the Mahoning, whence, most probably, (excluding those heretofore mentioned,) it should first receive the waters of that river. This is  $14\frac{3}{4}$ th miles from the summit.

From Stanley's mill to Tamarack creek,  $19\frac{1}{2}$  miles from the summit, the line still upon the slope of the hills would preserve its level, and thence descend to the valley of Tamarack creek; and again at the 21st,  $\frac{3}{8}$  from the summit. In this plane, it would cross Eagle creek near the 24th mile, and then fall to receive its waters, if it should be deemed expedient to do so.— From Stanley's mill to this point the fall by the survey would be 29' 6" 00". Hence the line would be in the same place to the village of Warren, where it would descend 29' 2" 00" feet, to receive, by a feeder of one mile and twelve hundred and sixty yards long, (at  $24\frac{1}{2}$  miles from the summit,) the waters of the Mahoning.

From the Warren feeder, the line would maintain its level, crossing, in its course, Mosquito creek, Squaw run, Crab creek, and Dry run. Near Williams' run, a descent of 46 feet (including the inclination of the plane from the Warren feeder) would conduct the line to the level of the meadows east of McWilliams', whence it might again descend 25 ft. 1 in. 81 feet, to receive, by a feeder of six hundred and eighty-four yards, (near the sixty-seventh mile,) whatever water may have fallen into the bed of the Mahoning below Warren dam. From the last mentioned feeder, the line would be on ground of easy excavation to the  $67\frac{3}{4}$  mile, where it would meet the Shenango river, about two thousand one hundred yards above the head of Beaver. An aqueduct across the Shenango, (for the construction of which the ground is very favorable,) would unite the canal with the Beaver route of the Pennsylvania canal, which, it is presumed, will be by the left bank of those creeks. The point of junction of the two canals, as determined by the survey, as well as by those which I had heretofore made, is 219 ft. 4 in. 32 above Lake Erie.

Besides the line now described, another was traced towards Flag meadows to the valley of the Shenango, above New Castle. That line is exhibited on the maps and profiles.

From the termination of the line which I have been describing, the route of a canal by the valleys of the Beaver and Ohio rivers, to unite with the Pennsylvania canal, and with the Chesapeake and Ohio canal near Pittsburgh, has also been surveyed. This would be about forty-nine miles long.

Should it be anticipated that the trade would justify the expense, and that the lockage water above the level herein assumed for the Ravenna summit, might be unequal to the extent of the business of the canal, an additional depth of cutting of 16 or 17 feet, would admit upon it the whole of the supply herein intimated for the lockage, and for the western division.— In addition to the constant supply from the Cuyahoga, the summit might, therefore, receive from Congress lake, Sandy lake, Muddy lake, Brady's lake, and Burnham's pond, 323,157,050 cubic feet of water.

If such were the condition of the summit in the first instance, then the canal would occupy the position assigned to the feeder from Burnham's reservoir, and that feeder would be dispensed with, the summit receiving the waters of the Cuyahoga at all times through Brady's lake, or through



Barnham's. The expensive feeder, which the maps exhibit as crossing the valley of Breakneck from Sandy lake, would also be suppressed, and the summit might be fed thence through Muddy lake and its feeder, and, perhaps, an examination of the ground having this object in view, might demonstrate the practicability of directing a branch of the Cuyahoga feeder towards Brady's lake, by a route requiring less expensive cutting than that which it follows in conformity with conditions resulting from the position of the plane which has heretofore been assumed for it. At this elevation, four locks would be saved: that is to say, two at either extremity of the summit.

Taking, then, for the level of the Ravenna summit, a plane below all the reservoirs, we would still have as the length of that portion of the summit east of Brady's reservoir, and for the Mahoning division, very nearly the same length of seventy-five miles; and the flowing waters of the Cuyahoga, and the Mahoning and its tributaries, would, in the dry seasons, be equal to the filtration and evaporation of so much of the canal. The western division, towards Akron, would then include 13 miles and 1,016 yards of summit to the head of lockage, east of Middlebury; but it would still be seventeen miles and fourteen hundred and twenty-nine yards long.

Reverting to our former estimate, the western division would require daily for filtration and evaporation, 1,548,583 cubic feet of water, and for the utmost operation of the canal, (five boats passing through the locks in each direction, and at the same time, every hour,) 135,000 cubic feet of water per hour, or 3,240,000 cubic feet per day; therefore, there might be required for the filtration and evaporation of this portion of the canal, and for the utmost expense of lockage water per day, 4,788,583 cubic ft. Hence the reservoirs with a summit sunk sixteen or seventeen feet lower than that given in the beginning of this report, would, together with the waters of the Cuyahoga and Mahoning at their lowest stage, be equal to the utmost operation of the canal of the dimensions of the Pennsylvania and Ohio canals, for a period of sixty-seven days, the locks not exceeding 8 feet lift each.

The survey of the bed of the Mahoning river to ascertain the inclination of the surface of that stream, was made by Capt. William Turnbull, assisted by Lieut. George D. Ramsay.

The survey of all the lines of canal and feeders, and of the reservoirs, was made by Lieut. J. A. Dumeste, assisted on the summit and western division by Lieut. John Farley, and on the eastern division, by Lieut. M. C. Ewing.

These surveys were conducted with the skill, care, and accuracy, which has always characterized the work of Captain Turnbull and Lieut. Dumeste, and the officers who assisted them.

Very respectfully,

I have the honor to be, sir,

Your obedient servant,

JAMES KEARNEY, *Lt. Col. and T. E.*

Lieut. Col. J. J. ABERT, *Topographical Bureau.*



*Table exhibiting the quantity of water afforded by the following streams.  
Report of Captain Mc Neill.*

| Name of Streams.  | When measured. | Where measured.     | Quantity of water per second in cubic feet. |
|-------------------|----------------|---------------------|---|
| Cuyahoga river    | 1825, Aug. 2   | At the rapids       | 127.7 by a float.                           |
| Do.               | 26             | Do.                 | 30.   |
| Do.               | Sept. 8        | Do.                 | 41.   |
| Silver creek      | Aug. 2         | Garrett's mill      | 8.57 orifice.                               |
| Do.               | 2              | Do.                 | 9.41 by a flat.                             |
| Eagle creek       | 24             | Near its mouth      | 18.7 do.                                    |
| Mahoning river    | 3              | Warren              | 96.11 orifice.                              |
| Do.               | Sept. 12       | Do.                 | 45.615 do.                                  |
| South Branch      | Aug. 25        | Price's mill        | 56.35 float.                                |
| Do.               | 26             | Do.                 | 34.577 do.                                  |
| West Branch.      | 23             | Stanley's mill      | 43.24 ( $\frac{1}{2}$ to be relied on.)     |
| Do.               | Sept. 13       | S. E. cor. Ravenna  | 15.608.                                     |
| Big Meander creek | Aug. 3         | Mouth               | .7502 dam.                                  |
| Big Meander creek | Sept. 8        | Do.                 | 89 do.                                      |
| Mosquito creek    | 8              | Do.                 | Dry.  |
| Do.               | 9              | Do.                 | 4.007 (rain.)                               |
| Crab creek        | 10             | Do.                 | 3.4 float                                   |
| Four Mile run     | 9              | Do.                 | 0.0188 float.                               |
| Mill creek        | 9              | Do.                 | .92 do.                                     |
| Yellow creek      | 9              | Poland              | Dry.  |
| Spring run        | 9              | 5 miles from Poland | .5 float.                                   |
| Squaw run         | 9              | Mouth               | .4 do.                                      |
| Breakneck creek   | 15             | Woodward's          | 3.144 nearly lowest stage.                  |
| Mahoning river    | 13             | S. E. cor. Ravenna  | 15.608.                                     |

*From Lieutenant Dumeste's Report.*

|                       |               |                 |                        |
|-----------------------|---------------|-----------------|------------------------|
| Cuyahoga river        | 1827, Oct. 13 | Mason's mill    | 30.7 probable minimum. |
| Barrel run            | 1828, July 30 | Do.             | 0.827.                 |
| Mahoning, West Branch | 26            | Ball's mill dam | 1.408.                 |
| Mahoning, West Branch | Aug. 7        | Newton's        | 6.05, August 14, rain. |
| Mahoning, West Branch | Sept. 10      | Warren          | 85.4 nearly, float.    |
| Hinkley creek         | July 30       | Do.             | Dry.                   |
| Eagle creek           | Aug. 25       | Confluence      | 27.139.                |



TABLE—Continued.

| Name of Streams. | When measured. | Where measured. | Quantity of water per second in cubic feet. |
|------------------|----------------|-----------------|---|
| Breakneck creek  | 1827, Sept. 15 | Woodward's mill | 4.169, at night, Saturday.                  |
| Do. -            | 16             | Do. -           | 4.169, Morning, Sunday.                     |
| Do. -            | 16             | Do. -           | 3.412, evening, Sunday.                     |

The only notice of rain in the field notes, from July 18, 1828, to October 9, 1828, (a period of 74 days,) is on the 14th August and 3d of Sept. On the 27th September, the Mahoning was said to be at its lowest stage. During this period the survey was progressing by the valley of the Mahoning towards its junction with the Beaver.

*From the Report of the Board of Internal Improvement.*

|                 |              |                             |         |         |
|-----------------|--------------|-----------------------------|---------|---------|
| Silver creek. - | 1824, Aug. 7 | East Branch, Steven's mill  | 0.664   | } 6.070 |
| Do. -           | 7            | West Branch, Garrett's mill | 5.406   |         |
| Cuyahoga river  | 8            | Rapid of Hiram              | 56.148. |         |

The engineers, in their report to the State of Ohio, estimate the Cuyahoga as yielding 4,000 cubic feet of water per minute. This is the result of Judge Bates' measurements.



( C )

*Extract from the Report of the Ohio Canal Commissioners, dated 2d October, 1826, on the subject of the Sandy Creek and Little Beaver Canal.*

In conformity to a resolution of the last General Assembly, some examinations have been made, for the purpose of ascertaining the practicability of making a canal, by the way of Sandy Creek and Little Beaver, to connect the Ohio river, at or below Pittsburgh, with the Ohio canal near the mouth of Sandy. The board have not been able to complete these examinations, as fully as would be desirable, in order to settle this question in a satisfactory manner. Having no engineer in their employment, whose time could be devoted to this object without neglecting duties of more pressing importance, Joshua Malin, Esq., an engineer of considerable experience, who is engaged on the Union Canal of Pennsylvania, was employed to superintend such surveys as were made. From these surveys it appears, that a canal on this route would involve the necessity of making a deep cut, of between one and two miles in length, and from 70 to 90 feet deep at the highest part of the dividing ground; or, of making a tunnel, of half a mile in length, with a deep cut at each end. A reservoir of considerable extent and capacity, would also be required, as the running waters susceptible of being thrown into the summit level, are not sufficient in dry seasons for its supply. A situation tolerably well fitted for the formation of a capacious reservoir, is presented in the neighborhood; but the sufficiency of the streams flowing naturally into this basin, or susceptible of being thrown into it at a moderate expense, to fill the reservoir to a valuable extent, is a question of much doubt, and one on which we are not prepared to decide.

( D )

*Report of Major Douglas on the Sandy and Beaver Canal.*

SANDY AND BEAVER CANAL.

To Messrs. Potter, Begges, Hanna, and others,—Commissioners of the Sandy and Beaver Canal.

GENTLEMEN:

From the notes and observations made along the line of the Sandy and Beaver Canal, by myself, in 1828, together with the surveys and measurements more recently furnished me, by the resident engineer,—I have completed the calculations and estimates for said canal, and have now the honor to communicate the results in the following report:

For convenience of reference, the line is divided into three natural subdivisions, called, respectively, the *Middle*, *Western*, and *Eastern Divisions*, which I shall describe in the order in which I have named them.

The *Middle Division* corresponds precisely with the summit level of the canal, and of course occupies the dividing ground between the waters of the Little Beaver and the heads of the Sandy. It is fourteen miles in length, commencing on the high ground about a mile and a half west of



New-Lisbon, and terminating in the valley of the Sandy, two miles below Hanover. The *first part* of its course, for about six miles, passes through grounds generally favorable, being level, easy of excavation, and of an uncommonly fine soil for retaining water. Two slight extra cuttings, of about a third of a mile each, and average depth of twelve feet, are the only particulars that deserve to be excepted from this remark. Another portion, of about four miles in length, winds among the head waters of the West Fork, (of Little Beaver,) and is somewhat more undulating than the preceding. Two deep cuttings occur upon it, of which the most considerable is 56 chains long by 36 feet *average* depth: the other is also about 30 feet deep, at an average, but only 15 chains long. With these exceptions, there is nothing particularly unfavorable; and, upon the whole, the better kind of ground greatly predominates. A third portion of this division, about two miles in length, intersects the principal dividing ridge, and reaches the head waters of the Sandy. This will require a tunnel of about 900 yards, for passing the more elevated part of the ridge and deep cuttings at each end, to the extent of about two and a quarter miles in length, and about 20 feet average depth. Four shafts have been sunk on the line of this tunnel, for the purpose of ascertaining the precise nature of the strata through which it will pass; and I am happy to say, that the result proves extremely favorable. The material at the level of the drift is a sand-stone rock, of moderate hardness, which would be excavated in the open air, for about 35 or 40 cents per cubic yard, and which, therefore, according to the analogy of such works, would not exceed one dollar and sixty cents in the drift, apart from the cost of removing the rubbish. This rock is found to be of sufficient depth in the stratum, to insure the stability of support without the assistance of masonry. The extreme height of the ridge above the line of the tunnel is 120 feet; but, at the positions where the working shafts would be sunk, the height does not exceed 84 feet. A small proportion of rock excavation will be necessary in opening the deep cut at the east end of the tunnel; but, on the west side, the rock disappears at the commencement of the deep cutting, and the length of the tunnel has been determined by this circumstance. A tunnel of such a length, and under such circumstances, cannot be regarded as a difficulty of very great magnitude; it probably will not be more expensive than a 48 feet cut of the same length in common gravelly loam. The remaining two miles of the middle division occupy the level flats of the Sandy below Hanover, and are wholly favorable. The feeders, which should be noticed in connection with the summit division of the canal, are for the purpose of introducing the waters of the following streams, viz: Davis' branch of Sandy, Mendenhall's do., Holland's do., and the main branch of the same, also, the West Fork of Little Beaver, and Cold Run. Of these, the two first will require a single feeder of about five and a half miles in length; the others either intersect the route, or lie contiguous to it, and may be introduced almost without expense. Should the purposes of trade be found to require a further supply, it is ascertained that a part of the waters of the Middle Fork; (of Little Beaver,) may be thrown into the summit level by an engine feeder, under circumstances singularly favorable, and at a very moderate expense. But of this I shall speak more particularly hereafter.

The *Western Division* of the route continues down the valley of the Sandy to its mouth, and is thirty-three and a half miles in length, from the first



lock, below Hanover, to the village of Bolivar, on the right bank of the Tuscarawas, where it intersects the line of the Ohio and Lake Erie Canal. No part of the route on this distance offers any impediment worthy of particular discussion. On the contrary, the fine open plains and gentle declivities by which the valley of Sandy is remarkably characterized, offer on a large part of it, a choice of favorable locations; and, if it were not for the lockage, and the expediency of crossing the creek occasionally, in order to shorten the distance, the construction of this division would be reduced to a very low minimum indeed. The soil is generally a light species of gravelly loam, inclining to clay towards the head of the valley, and becoming somewhat more sandy westward: but, though generally easy of excavation, it is no where so loose or light, as not to afford, with proper attention to the slopes, good and sufficient banks. The lockage amounts to about 223 feet, including one ascending lock at the junction of the Ohio line. *Feed water* is received from one or two tributaries of the Sandy, and from the Sandy itself, as occasion requires; generally, however, at such points that the dams may also be used with advantage, in crossing the stream. The dams are of moderate length, and do not exceed an average of four and a half feet in height. There are three crossings of this description, and three by means of aqueducts, including that across the Tuscarawas, at the termination of the line. A few instances of bluff bank occur on the location side near the mouth of the Sandy, amounting to about *three-fourths* of a mile in all. These will require protection walls, or they may be secured by diverting the stream into a different channel.

The *Eastern Division* of the line commences at the eastern extremity of the summit level, and immediately descends, by a rapid succession of locks, to the level of the middle fork of the Little Beaver. It then follows the valley of that stream to its confluence with the Ohio, and up the right bank of the latter to the mouth of the Big Beaver, where it intersects the route of the Pennsylvania State Canal. Its precise length will depend somewhat upon the ultimate location of the latter; pending which, it is considered as terminating at the end of the forty-third mile, near the Beaver bridge.

The flight of locks, mentioned at the commencement of this division, descends a ravine, of nearly uniform declivity, and of convenient dimensions for all purposes of construction. The number of locks is *twenty-seven*, having an aggregate lift of 162 feet, (6 feet each,) in a distance of one and a half miles. This will afford intermediate basins of 186 feet length, which, by occupying rather greater width and depth than usual, will be sufficient to make locks of this lift independent of each other. It may be observed, that locks, under the circumstances, and in the relative position here described, are frequently built with more convenience and at less expense than in the ordinary way; as, by shelving down the bottom of the basins, from lock to lock, the necessity of breast walls is entirely removed. In the present instance, it is another favorable circumstance, that the bottom of the ravine, on a considerable part of the descent, is composed of ledges of rock, which, while they furnish in part the material for the locks, will also afford an imperishable foundation for all the works. The foot of this flight of locks reaches the middle fork of Little Beaver, from which a feeder is taken, and the line then crosses immediately to the left bank. From this point, through the town of New-Lisbon, and to about five miles beyond, the location is extremely favorable through a succession of mead-



ows and river flats; but, below this limit, the valley begins to assume a more bold and precipitous character, and on all the remaining distance to the Ohio, furnishes a very strong contrast to the flat, open topography of the western division. This feature, however, is not without its advantages for the construction of the canal; as we are enabled, by the narrowness of the stream, and the boldness of its banks, to dam it with the greatest facility, and thus form slack water pools, from 100 to 300 rods in length, in many places, where the construction would be otherwise attended with considerable difficulty. About five miles are thus constructed in a distance of nineteen, reducing the labor of excavation to the mere formation of a tow-path, in addition to the necessary dams; and it results, that the construction of the canal down this valley, rude and unpromising as it appears, is very little more expensive than the ordinary average of an open route. The employment of this mode of construction secures at the same time the necessary feed water for the use of the canal. In one instance only, a separate feeder is required for the purpose of leading the water of the north branch into a dam located on the main one, a little above the confluence. About two miles above this confluence, the line for the first time after leaving New-Lisbon, crosses by a dam to the right bank, and continues down that side to the mouth of the creek, where it re-crosses by an aqueduct. The continuation of the line, from this point to the mouth of Big Beaver, occupies the flats of the Ohio just sufficiently above the line of extreme high water to secure it from the freshets, the ground at this level being free from any great irregularities, and generally favorable in other respects. A basin is projected at the end of the 43d mile, in which the present location terminates; and, in case the Pennsylvania canal should be located on the west bank of the Big Beaver, which the reports on that subject seem to indicate as most probable, a few rods only of excavation will remain to complete the navigable connection.

The total lockage on this division is 429 feet, including a rise of about 12 feet on the ascent of the Ohio. Having thus particularly described the whole route of the canal, properly so called, and exhibited the various local advantages and disadvantages, under which it will have to be constructed, I proceed next to examine the important question relative to the supply of water.

The interesting situation and relations of this canal, regarded as a connecting link between the state improvements of Ohio and Pennsylvania, give a high degree of interest to every question of this kind; and, as some doubts have been expressed on this subject, it did not fail to engage early and particular attention. Soon after my arrival on the line, dams were constructed on all the principal streams of the summit level, that is to say: Davis' Branch of Sandy, Mendenhall's and Holland's Branches of the same, and the main branch below Hanover; also the West Fork of Little Beaver, and Cold Run. These dams were furnished with waste weirs, of the proper shape and dimensions for gauging, and built with some degree of permanency, so as to afford a series of measurements, during the whole of the dry season. At the time of their construction, the streams were yet on the decrease, but on the 29th of August, when they appeared nearly to have reached their lowest limit, the weirs were measured, and found to yield an aggregate of 736 cubic feet per minute. On the 6th September, the drought being still uninterrupted, the measurement gave 708 cubic feet, and the same on the 18th; but about the 1st of October the waters



began to rise, and by the 6th of the same month, the aggregate flow was upwards of 2000 feet per minute. From these measurements, and my own knowledge of the state of the water, previously to the 29th of August, I have assumed the duration of extreme drought of the year 1828, at about *seven* weeks; and the average supply during that time, at 722 feet per minute, being the mean of 736 and 708. This will appear a safe estimate, when we consider that the waters generally, before the 29th of August, were *higher* than *at that time*, and that the average *afterwards*, was also higher than at the times of measurement; for those measurements were always made after the longest interval of continuous drought, and when the streams were least affected by occasional rains, of which there were several instances in the course of the dry season. According to the best information that could be obtained, the streams had seldom, if ever, been seen as low as in 1828; but that there may be no room for doubt on this head, I suppose the duration of drought in *general* to be 60 days, instead of seven weeks, at the rate above mentioned, which will comprehend nearly the whole of August and September.

The summit level of the canal I propose constructing with an extra depth of three feet, which will make it a reservoir for about *ten millions cubic* feet of surplus water. This will enable us to secure the product of every shower during the summer, for the use of the canal, and, (being filled of course, in the earlier part of the season,) will afford us, even without any accessions of this kind, a regular supply of 114 cubic feet per minute, in addition to the preceding, during the whole sixty days. We may also estimate, at least, 50 cubic feet per minute, from the heads of Brush Run, and several other small but permanent spring streams, by which the line of the canal is intersected, and which are not included in the foregoing estimate. The aggregate of the whole is 886 cubic feet per minute; we shall presently add to this, the produce of an engine feeder from the middle fork of Little Beaver; but to show more clearly the grounds of *certainty* upon which this canal may be undertaken, let us first inquire how far this supply alone, without any such addition, would meet the expectations of public convenience and revenue.

In the first place, it will have to supply the losses of soakage and evaporation on about twenty miles of the canal. The soil of a considerable portion of this distance is a strong clay, in which very little water can be lost by soakage; and even the most unfavorable parts contain so considerable a mixture of clay, that, with a very little care in the construction, they may be rendered nearly water-tight. Under these particular circumstances, I consider 22 cubic feet per mile per minute, as entirely sufficient for the supply of these losses on the middle division; which gives a total of 440 feet for the 20 miles. One hundred and twenty cubic feet per minute, must then be allowed for leakage and waste at the gates; which, with the former, being deducted from the total supply, leaves 326 cubic feet per minute, for the purposes of lockage, or 234,720 cubic feet per diem, at each end of the summit level. The locks are of 6 feet lift, 15 by 90, and contain 8,100 cubic feet; this quantity, therefore, will afford nearly 29 locks full, and as *three* locks full will generally pass *four* boats, in the average order in which they present themselves, we have a navigation of  $38\frac{1}{2}$  boats per diem, from the supply in question. This seems a very moderate number; but let us examine it a little further; and first with reference to the question of revenue. Thirty-eight and a half boats per diem,



during the *summer* months, correspond, according to the ratios furnished us by the New-York canal, with an aggregate of 10,000 boats per annum; and if we suppose an average cargo of 25 tons, (the burden of the boat being full 50,) we shall have a total of 250,000 tons, and a toll, at one cent per mile per ton, of \$226,250 per annum, or nearly 18 per cent. on the whole cost of the canal. Let us also examine it with reference to public accommodation. At Rochester, on the New-York canal, the average number of passages per diem, during the months of August and September, 1828, was about 27, and from circumstances communicated in the last report of the commissioners, I infer that it must have been even less than 24 during the past season; the probable mean is about *one-half less* than the number which could have been passed during the same months, on the Sandy and Beaver canal, with only the natural supply of water on the summit; and if we admit the trade of Rochester to be a fair term of comparison, it does not appear probable that the business of the Sandy and Beaver canal will immediately require a larger supply than this. That it may do so, however, in the course of a few years, is by no means unlikely. Its object is to connect the trade of the Ohio canals, by a direct route with Pittsburgh and Philadelphia, and ultimately, perhaps, with Baltimore and Washington; and if we may infer an increase of trade, corresponding in any degree with the advancement of population and public wealth in the State of Ohio, the time is not distant when other supplies will be called for. In this case, we look to the Middle Fork as already suggested, and I now proceed to show the manner and probable expense of obtaining any required addition of feed water from this stream.

The point at which it is proposed to take it out, is 68 chains from the line of the summit location, opposite the end of the second mile, and 125 feet below the ground rising immediately from the edge of the creek to the level of the line. A few yards from the water, and near the level at which the steam engine would be placed, a rich vein of bituminous coal breaks out and shows itself with a thickness of about three feet, to a considerable distance, up and down, on both sides of the creek. This coal has been wrought to some extent at the furnace a short distance below, and it is fully ascertained that it may be delivered at the mouth of the pit at one and a half cents per bushel.

I have estimated it at 2 cents delivered at the engine, which makes the cost of fuel only 4 dollars for an engine, consuming two hundred bushels, per diem.

The total cost of a feeder, deriving its supply by an engine of this power, kept in perfect repair, and working at the rate of ten weeks per annum, may be estimated as follows:

|   |             |
|---|-------------|
| For the engine and the necessary buildings, | \$10,000 00 |
| 250 yards main pipe, at 24 dollars,         | 6,000 00    |
| 1,200 yards wooden leader, 4 dollars,       | 5,000 00    |
|   | <hr/>       |
| Total first cost,                           | \$21,000 00 |
| Fuel as above at 4 dollars per diem,        |             |
| ten weeks,                                  | \$280 00    |
| Wear, tear, and attendance, at 5 dollars,   | 350 00      |
|   | <hr/>       |
| Total annual expense,                       | \$630 00    |



|   |                         |
|---|-------------------------|
| Say 700 per annum, equivalent to an investment of | \$10,000 00             |
| Total capital,                                    | <hr/> \$31,000 00 <hr/> |

The performance of the engine will depend upon its construction. This is differently estimated by different engineers. According to the performance of the Cornwall engines in 1815, an engine consuming 200 bushels of (English) coal per diem, would raise about 400 cubic feet per minute, to the height required; but from the work of the engines of the same district, in 1828, such an engine would raise no less than 670 cubic feet.

Taking the mean of these results, and making a reasonable allowance for any supposed difference in the quality of the coal, I get 460 cubic feet per minute, by way of estimate, for the performance of the engine in question, which is also a fair estimate from the working powers of several engines in our own country. This will increase the quantity of lockage water from 326 to 786 feet per minute, and the capacity of the canal from  $38\frac{1}{2}$  boats per diem, to 93 boats. A trade to this extent, during the summer months, according to the ratios heretofore quoted, corresponds to a navigation of 24,111 boats per annum, (almost double the number of arrivals and departures at Albany during the past season) and an aggregate toll of 542,400 dolls. These calculations are made upon practical grounds, and with liberal allowances on all points which involve any doubt. It may be satisfactory to some, however, to know, that in case of necessity, the middle fork could easily spare 3 or 400 feet more, without prejudice to the supply of the eastern division.

The summit level being thus provided for, there can be no doubt of the sufficiency of water on every other part of the canal. On the Western division, some additional supplies will be gained at the dam below the lock No. 7, which, with the small streams intersected by the line below, will be more than sufficient for the soakage and evaporation to Pekin. Below Pekin, and after taking in Hugill's Run, there will be surplus sufficient to admit an increase of 2 or 3 feet in the lift of the locks; and finally, from Waynesburgh down, the locks may safely be constructed, if necessary, with lifts of ten feet. On the Eastern division, there will be a sufficiency for 10 feet locks, immediately after taking in the first feeder from middle fork above New-Lisbon; and from that point down, locks of 9 and 10 feet, may be used without fear, so far as water is concerned. It only remains now to add a few remarks on the construction of the works, and the scale of prices, preparatory to the estimate.

The connection of this canal with the canals of Ohio and Pennsylvania, (both modelled after the New York canal) indicates at once, the tonnage of the boats to which it should be adapted, and the size and proportion of all the works. Accordingly, the section of the canal has been assumed at 40 feet surface, 28 feet bottom, and 4 feet deep, and the locks at 90 feet by 15. The profile of the summit level only, is varied as already suggested, so as to admit a depth of 7 feet instead of 4. The tunnel is projected with a transverse section of 30 square yards, except two recesses of the length of 75 feet each, which are enlarged to 50 square yards, making an average of  $33\frac{1}{4}$  on the whole length of the drift. This goes upon the supposition that the tow path is discontinued through the opening. It could not be retained without an additional expense of 15 or 16 dollars per yard run; and its use may be easily supplied by an endless chain, and stationary



horse power, for less than one-tenth that amount. The feeder from Davis' Branch, it is proposed to construct of wood. It will not differ much in point of expense, from an excavated feeder, and will have greatly the advantage in retaining the water. The dams, generally, are supposed to be built in the usual way, of timber, filled in with stone and gravel; the aqueducts with trunks of wood; and abutments and piers of masonry. Good materials for masonry are found every where, within a short distance of the line and in many places where the most expensive constructions are required, the best of building stone occurs on the spot. With these advantages, the locks and other works of masonry would probably be executed at less expense (perch for perch) on this line, than on canals generally; but as many of the locks are of moderate lift, and on that account somewhat more expensive in the gross, I have estimated them at \$600 per foot throughout, which is a very liberal average of the lock contracts on the Pennsylvania canals. Other works are estimated by a scale equally safe: as for instance, excavation of earth, generally from 7 to 10 cents, and in deep cutting, as high as 16; rock, in ordinary situations, 35 to 50 cents; in the shafts of the tunnel, \$1,25, and in the drift of the tunnel \$2; embankments, 10 to 15 cents; dams across small streams and of moderate elevation, 4 to 9 dollars per foot; those of greater height, 15 to 25 dollars; aqueducts, 35 to 50 dollars per foot run; tow path bridges, farm and road bridges, and culverts, according to the prices on the western division of the Pennsylvania canal.

The aggregate result per mile, is exhibited in the following *summary estimate*, together with the causes of extra expense, whenever they occur.

#### MIDDLE DIVISION.

|  |             |
|--|-------------|
| Mile 1. Extra cutting, part rock               | \$10,355 14 |
| 2. Do. do.                                     | 10,346 16   |
| 3. Fair  | 2,366 40    |
| 4. Do.   | 2,052 68    |
| 5. Ordinary                                    | 5,082 30    |
| 6. Do.   | 4,855 90    |
| 7. Embankments                                 | 12,015 50   |
| 8. Deep cutting, part rock                     | 39,351 92   |
| 9. Extra cutting, part rock                    | 12,205 54   |
| 10. Do. do.                                    | 7,361 85    |
| 11. 924 yards tunnel, at \$78 50, and deep cut | 112,403 18  |
| 12. Deep cutting                               | 37,902 80   |
| 13. Extra cutting in part                      | 8,544 20    |
| 14. Fair feeder from Davis' Branch             | 21,815 34   |

Total, Middle Division, \$286,658 91

#### WESTERN DIVISION.

|              |          |
|--------------|----------|
| Mile 1. Fair | 2,979 92 |
| 2. Do.       | 2,691 06 |
| 3. Do.       | 2,582 44 |
| 4. Do.       | 2,535 76 |



|  |              |
|--|--------------|
| 5. Dam and guard lock and turnpike bridge  | 7,633 16     |
| 6. Fair                                    | 2,530 78     |
| 7. Do.                                     | 4,209 64     |
| 8. Do.                                     | 3,054 84     |
| 9. Aqueduct                                | 12,221 02    |
| 10. Fair                                   | 3,092 48     |
| 11. Feeder at Pekin                        | 4,179 96     |
| 12. Fair                                   | 3,516 64     |
| 13. Do.                                    | 3,622 32     |
| 14. Do.                                    | 4,879 36     |
| 15. Do.                                    | 4,636 04     |
| 16. Do.                                    | 2,822 80     |
| 17. Do.                                    | 3,575 56     |
| 18. Dam and guard lock, Waynesburgh        | 9,441 20     |
| 19. Fair                                   | 3,822 27     |
| 20. Do.                                    | 3,090 88     |
| 21. Do.                                    | 4,231 03     |
| 22. Do.                                    | 2,654 72     |
| 23. Do.                                    | 3,145 04     |
| 24. Do.                                    | 2,912 48     |
| 25. Do.                                    | 3,883 72     |
| 26. Do.                                    | 4,729 17     |
| 27. Dam and guard lock at Sandyville       | 13,195 22    |
| 28. Fair                                   | 4,776 16     |
| 29. Do.                                    | 4,535 54     |
| 30. Do.                                    | 4,082 64     |
| 31. Aqueduct and extra cutting, part rock  | 24,988 70    |
| 32. Fair                                   | 2,910 10     |
| 33. Do.                                    | 3,989 52     |
| Half mile fraction crossing the Tuscarawas | 20,758 68    |
|  | <hr/>        |
|  | 188,510 85   |
| 222.66 feet lockage, \$500                 | 133,596 00   |
|  | <hr/>        |
| Total, Western Division,                   | \$322,106 85 |

## EASTERN DIVISION.

|                             |           |
|-----------------------------|-----------|
| Mile 1. Embankment          | 9,839 36  |
| 2. Do. and aqueduct         | 7,550 84  |
| 3. Fair                     | 4,191 78  |
| 4. Do.                      | 3,699 94  |
| 5. Do.                      | 3,057 85  |
| 6. Do.                      | 2,614 04  |
| 7. Do.                      | 2,511 76  |
| 8. Do.                      | 4,641 02  |
| 9. Slack water in part      | 3,415 40  |
| 10. Dam and guard lock      | 11,076 64 |
| 11. Fair                    | 3,457 38  |
| 12. Embankment and sideling | 8,029 36  |
| 13. Do. do.                 | 5,380 12  |



|  |             |
|--|-------------|
| 14. Fair   | 3,612 72    |
| 15. Slope wall   | 7,582 52    |
| 16. Do. and extra embankment                           | 11,069 92   |
| 17. Fair, sideling in part                             | 5,146 27    |
| 18. Dam and guard lock                                 | 9,468 24    |
| 19. Sideling   | 5,559 56    |
| 20. Dam and guard lock                                 | 9,208 44    |
| 21. Fair   | 2,800 00    |
| 22. Dam and guard lock, and feeder from North Branch   | 11,903 44   |
| 23. Fair   | 2,676 40    |
| 24. Dam and guard lock, extra rock, &c.                | 15,679 56   |
| 25. Undulating   | 4,620 36    |
| 26. Dam  | 8,608 98    |
| 27. Fair   | 3,024 66    |
| 28. Slack water  | 4,490 00    |
| 29. Dam and guard lock, extra embankment, and aqueduct | } 33,167 36 |
| 30. Aqueduct   |             |
| 31. Undulating   | 6,927 56    |
| 32. Do.  | 4,012 24    |
| 33. Fair   | 4,512 26    |
| 34. Ordinary   | 3,024 17    |
| 35. Fair   | 5,803 70    |
| 36. Extra embankment                                   | 3,458 00    |
| 37. Extra cutting                                      | 5,114 40    |
| 38. Fair   | 4,347 76    |
| 39. Extra cutting                                      | 2,870 39    |
| 40. Protection wall                                    | 4,940 76    |
| 41. Embankment and aqueduct                            | 4,836 28    |
| 42. Slope wall   | 7,370 41    |
| 43. Fair   | 9,304 40    |
|  | 3,196 52    |
|  | <hr/>       |
|  | 277,802 77  |
| 429 feet lockage at \$600                              | 257,400 00  |
|  | <hr/>       |

Total, Eastern Division, \$535,202 77

#### GENERAL SUMMARY.

|                             |          |                             |
|-----------------------------|----------|-----------------------------|
| Middle Division             | 14 miles | 286,658 91                  |
| Western Division            | 33½      | 322,106 85                  |
| Eastern Division            | 43       | 535,202 77                  |
|                             | <hr/>    | <hr/>                       |
| Nett total 90½ miles        |          | \$1,143,968 53              |
| Engine feeder               |          | 31,000 00                   |
|                             |          | <hr/>                       |
|                             |          | 1,174,968 53                |
| Contingencies, 10 per cent. |          | 117,496 85                  |
|                             |          | <hr/>                       |
|                             |          | Grand total, \$1,292,465 38 |



In conclusion allow me to observe, that the efficient manner in which Mr. Malin has discharged the duties confided to him entitles him equally to my acknowledgments and the commendations of the Board.

All which is respectfully submitted,

D. B. DOUGLAS,

*Profes. Eng. U. S. Military Academy.*

WEST POINT, *February 1, 1830.*

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*Report of the Engineer appointed to examine the route of the Pennsylvania and Ohio Rail Road.*

*To the Pittsburgh and Ohio Rail Road Committee:*

GENTLEMEN—In the month of October last, I received from your body a letter of instruction directing an immediate examination of the ground lying between the city of Pittsburgh, and the Ohio Canal, for the purpose of ascertaining the practicability of locating thereon a Rail Road. From examination it appeared that that part of the route leading down the Ohio to the mouth of Big Beaver creek, a distance of 28 miles, was evidently so favorable as to render minute examinations with the instruments entirely unnecessary for present purposes. My attention was accordingly turned to the investigation of that part of the contemplated route lying between the mouth of Big Beaver creek and the Ohio canal.

In your letter of instruction, you were pleased to give an indefinite latitude in the choice of ground upon the last mentioned division, directing, however, that full examinations should be made as to the two terminations, the one at Massillon, the other at Bolivar.

The instruments were, accordingly, placed upon the ground at the mouth of Big Beaver creek. There is no choice of ground, and the only practicable route for a rail-way is clearly pointed out by the formation of the country. We must pursue the margin of the Ohio river, for the distance of nearly 12 miles, when we reach the mouth of the Little Beaver creek. Our route must then fall into the valley of this creek, and must be confined to it absolutely, until we reach the junction of the west and middle branches of the creek, distant about 16 miles from the Ohio river, measured by the creek valley, up to this point. There can be no choice of ground, and our route cannot deviate in a single instance, from that already mentioned. At the junction of the west and middle branches of the Little Beaver, there were two modes of reaching the Ohio Canal; the one by the west fork and the valley of Sandy, terminating at the town of Bolivar, on the Ohio Canal. The other by the way of the middle fork to the town of New Lisbon; thence, across the country to Georgetown; thence, west to Canton; and thence, across the country to Massillon, on the Ohio Canal. A choice between these two routes was to be made. The notes of a survey upon the Beaver and Sandy route were in my possession.— This survey was made for the purpose of locating a canal, but of course could furnish much information with regard to the practicability of a rail-road. Some examinations had likewise been made, disjointedly, upon the Lisbon and Massillon route. From these data, and the following considerations, a conclusion was to be drawn, and a choice made.



If the Beaver and Sandy route be pursued, the line lies through a portion of country comparatively sparse in population, and upon which little or no stock could possibly be subscribed. Moreover, the ultimate extension of the route beyond the Ohio Canal, into the interior of Ohio, (a matter of deep moment,) seemed, from the nature of the ground, as exhibited by maps in my possession, to be next to utterly impracticable, provided we terminate our contemplated road at the mouth of Sandy. It is likewise deemed an important consideration, in locating a road such as the one in agitation, that it should be so situated as to accommodate itself to the best interests of those who are to be affected by its construction. If the Lisbon, and Canton, and Massillon route should prove practicable, and would bear a comparison, in point of distance, with the other, it presented many advantages over the Sandy and Beaver route, which could not be overlooked in the decision of the important question, which route should be chosen.—By adopting the Lisbon and Massillon route, our line would lie through a thickly populated and highly cultivated country; besides enlisting in its favor all the capital of three flourishing towns, Lisbon, Canton and Massillon. These villages contain much of the wealth and enterprise of their respective counties; and it is from the inhabitants of these places, if from any source, we may hope for a warm interest and liberal subscription. The expenditure of some thousands of dollars already, in examinations at hazard, speaks loudly for the truth of the above assertion. With these views, and upon these grounds, it was resolved to throw our party at once upon the Lisbon and Massillon route; and ascertain to a certainty its practicability or impracticability. During the prosecution of this work, communications were made to your body, detailing the progress we had made, and the unexpected facilities which presented themselves for the location of our road. Previous to terminating the examinations upon this route, and at a stage at which there remained little doubt of its practicability, your body were pleased to direct that the examinations should cease with the closing of the Lisbon and Massillon line. According to these instructions, on the 3d instant, the line was closed, and those of the party whose services were no longer required, were paid off and discharged.

Having laid before you the reasons which induced the course which I have pursued, I shall now present you with the general characteristics of the route, as developed by our examinations. Agreeably to your instructions, our examinations were commenced at the mouth of Big Beaver, assuming an elevation, on the Ohio bank, equal to the probable height of the Big Beaver viaduct; assuming a grade rising at the rate of 16 feet per mile, our line is carried down the Ohio river, and upon a hill side in some places steep and inclined to wash, but generally fair and easily graded, since it is only necessary to cut enough earth from above to embank below. Having crossed Two Mile run, the hill side becomes more rough and broken; the ledge of sand-stone shewing itself upon the surface at intervals. By changing our grade to 32 feet rise per mile, we are, at the end of the fourth mile, enabled to rise upon the fine second bottom upon which the stone house of Mr. Potter is situated. The route is then fair, and gently descending, until we reach Six Mile run, which will require a viaduct, and some heavy embankment. Wolf run forms another deep indentation in the shore, and will require a viaduct, perhaps 30 feet high.—Our line still continues upon the hill side, which affords choice ground for nearly a mile. The hill then becomes more bold and precipitous; the rock



rising to a perpendicular height of perhaps 70 feet. Our route must pass the base of this ledge, and precaution must be had against the rock, which threatens to detach from above. This will be necessary in but a single instance, and that for a short distance. Our grade of 32 feet carries us upon the beautiful and extended bottom owned by the heirs of Mrs. Hoge: any choice of ground may be here obtained for the distance of two miles. Leaving this bottom, the route becomes somewhat broken; the hill receding, and the land running down in slight undulations to the river. The grade may, however, be so accommodated to the ground as to render the excavation and embankment comparatively small. This character of ground continues up to the termination of the 12th mile. Here the side hill again ceases abruptly, and a ledge of broken sand-stone is seen for perhaps half a mile. Our route must lie at the base of this ledge, but not so near as to be in danger from the falling masses of rock. Crossing Dry run, the character of the ground becomes less rugged, the hill side smoother, and the descent more gradual, rendering the construction less difficult.  $14\frac{1}{4}$  miles from Big Beaver bridge our line strikes the mouth of Little Beaver creek, and crosses by a viaduct to the western shore, and falling into the valley, pursues it up to the town of New Lisbon, distant 37 miles from our starting point. I shall here merely describe the general features of the Beaver valley, referring for particulars to the detailed report. The stream is very serpentine in its direction, and winds its way among hills which rise upon either side to the height of perhaps 500 feet. In most instances there is a narrow bottom of land skirting the edge of the water; and it is upon this bottom that our line is located. Owing to several sharp bends in the course of the stream, it becomes necessary to cross it at several points; but as most of the crossings are low, a cheap construction for viaducts may be used so as to make the additional expense of those miles upon which they occur, little above the average cost per mile.

Leaving the town of New-Lisbon, we still continue on the hill side of the creek; and ascending at a grade of 32 feet per mile, we reach the Beaver dam summit, distant about four miles from Lisbon. Leaving the Beaver dams, our course is then westward, over a fine level and open country, nearly six miles. We then pass a gorge in the hills, of remarkable formation, and fall immediately into the valley of the Mahoning creek, which affords a very fair prospect for a cheap location. This valley is pursued until within one mile of the village of Georgetown, distant about 14 miles from New Lisbon. Passing Georgetown, the ground becomes broken and hilly, and so continues for about six miles. The excavation may, however, be so regulated as to make the necessary embankment.

The next nine miles present a variety of ground: the greater part of it may be graded at an expense little above the average. At the house of Mr. Loutzenhiser our line crosses the "old Thomas road;" and thence to the town of Canton the route is remarkably direct and favorable. The whole distance from New-Lisbon to the court-house in Canton is measured 26 miles and two chains.

Leaving Canton, our line continues westward, crosses the west fork of Nimishillen Creek, taking a direct course to the Buck Ridge summit, which is crossed with short cutting of about eight feet average. The ground then descends for half a mile, then rises gently to the summit, near Mr. Rex's house, presenting a surface that will be easily graded. Passing this summit, we fall into the valley of the "Crooked Run," which leads us



by a direct course, and a gentle descent, to the Ohio Canal, at the town of Massillon. Having thus completed a descriptive memoir of the whole route, it may be well to present in this place some general remarks upon its different divisions.

Down the Ohio River, and up the Beaver creek, to the Beaver dam summit, a species of sandstone occurs in the greatest abundance. The use of this stone will render the construction of culverts and viaducts, which occur most frequently in this portion of the route, comparatively cheap. After leaving the Beaver dam summit, there is found little or no rock formation upon the surface for the remainder of the distance. In no instance has the grade been allowed to exceed the limit of 32 feet per mile; which presents no obstacles to the transportation of a given load by the same power from one extremity of the route to the other. The curves which have been adopted have, in no instance, a radius less than one thousand feet, which will admit the uninterrupted velocity of locomotive engines. In so general a report, none but general estimates of expense can be expected; and as these must vary according to the different modes of construction adopted, I shall here only state that the average cost per mile, upon the whole distance, may be made to vary from 18 to 20 thousand dollars.

In conclusion, I may remark, that the route is one of at least ordinary practicability. The whole distance from Pittsburgh to the Ohio Canal is less than one hundred and eight miles; from whence it appears our route is remarkably direct. Taking into consideration the immense advantages which must flow from such a connection, and the rich and fertile country through which it passes, we may be warranted in the belief, that stock here invested must prove as productive as any upon a route of the same length in any part of the United States.

Respectfully submitted,

O. MITCHEL, Engineer.



